Education & Workforce Development: Texas-Japan Partnership Preparing the Workforce of the Future

USJC Japan-Texas Economic Summit

Tuesday, May 8th

With you today….

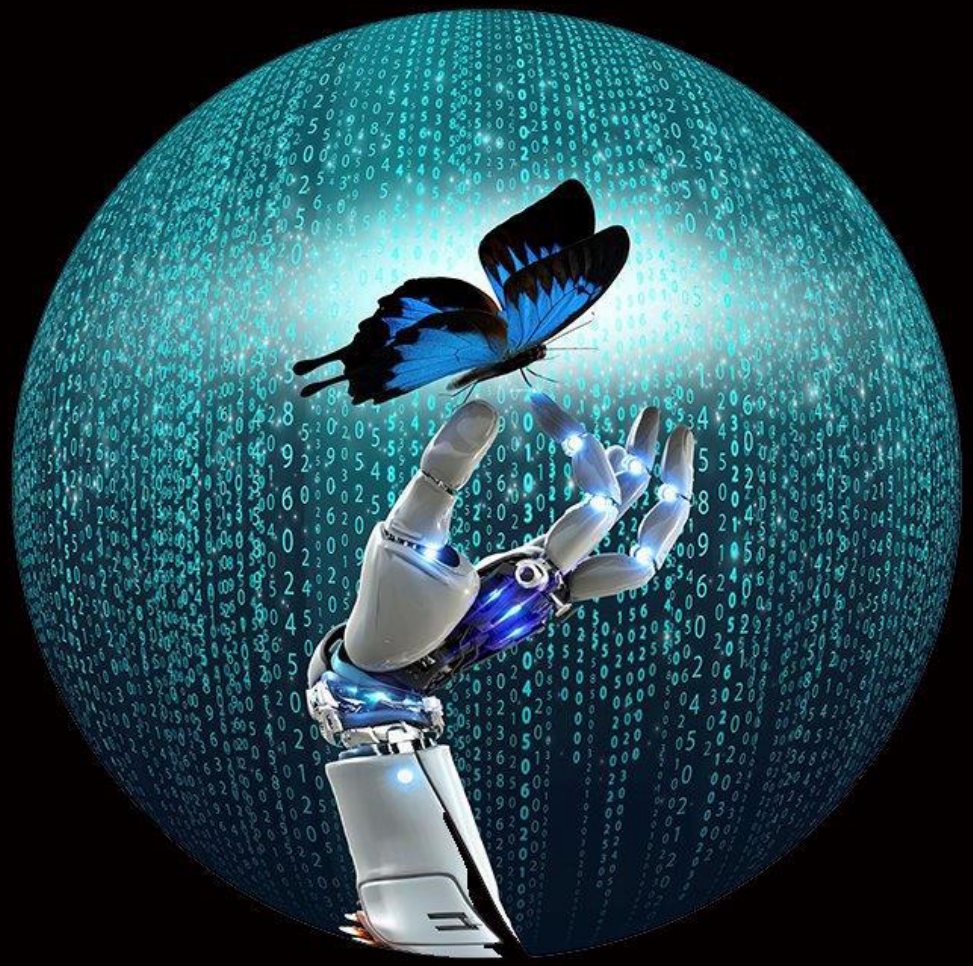
Ron Harman
Principal and Future of Work Leader, Deloitte Consulting LLP

Barrett S. Caldwell
Professor, Purdue University & Jefferson Science Fellow, U.S. Department of State

Motoko Uchitomi
Japanese Aerospace Exploration Agency (JAXA)

Romanita Matta-Barrera
Executive Director, SA Works

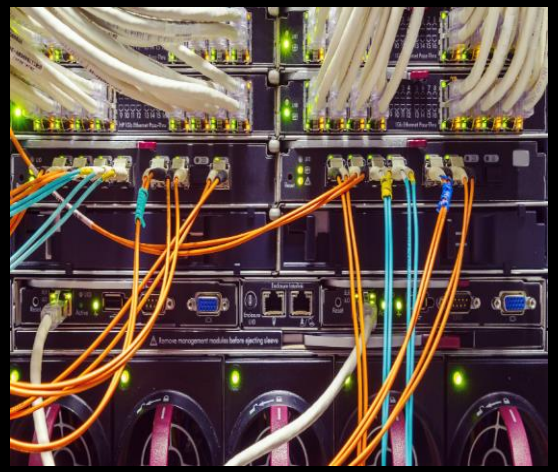
Deloitte.



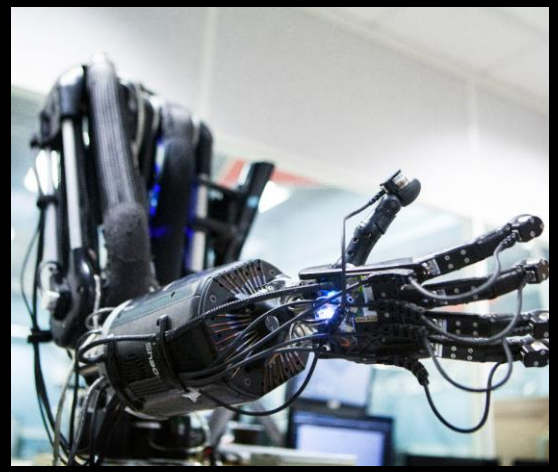
Deloitte Future of Work

7 Disruptors

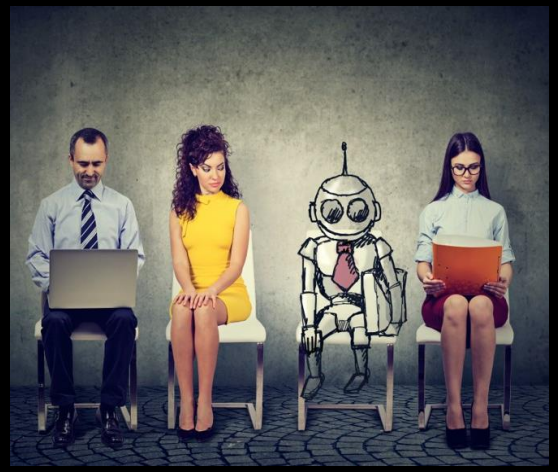
Technology is Everywhere



Tsunami of Data



AI, Cognitive Computing, Robotics



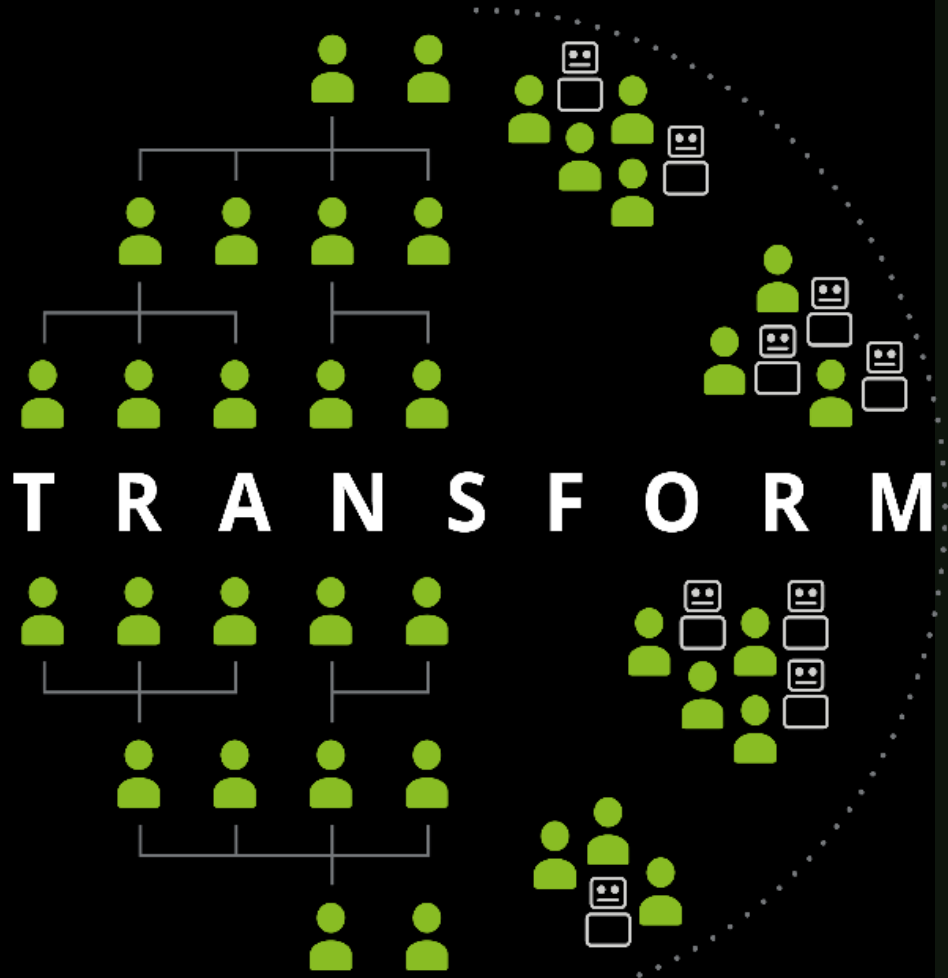
Jobs Vulnerable to Automation

Diversity/Generational Change

Careers – 100 year life

Explosion in contingent work

The augmented workforce



Employees

Joint Ventures

Contractors

Freelancers

Crowds

Robots

DISRUPTED

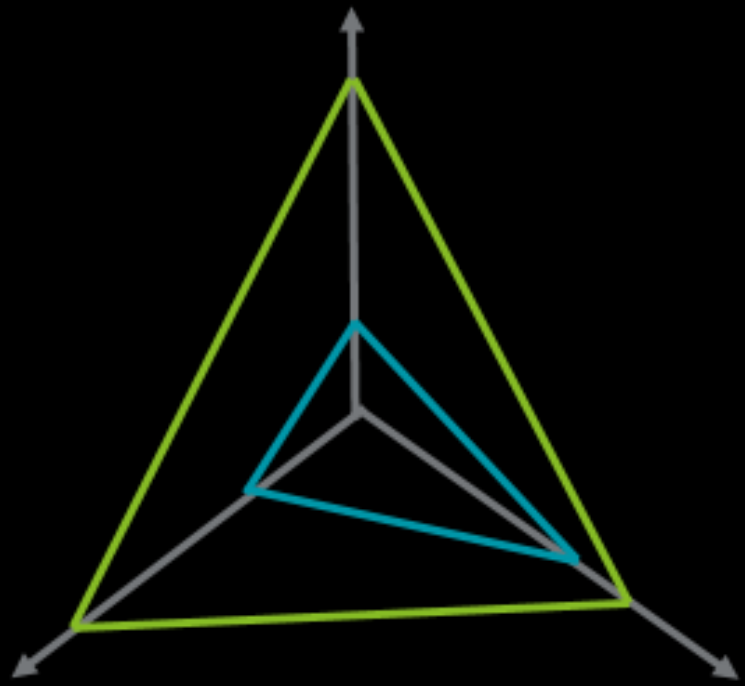
Greater number of talent options

Source: Deloitte, 2017

Three dimensions changing the future of work

2

WHO?
"Workforce"
Talent category



Current work options

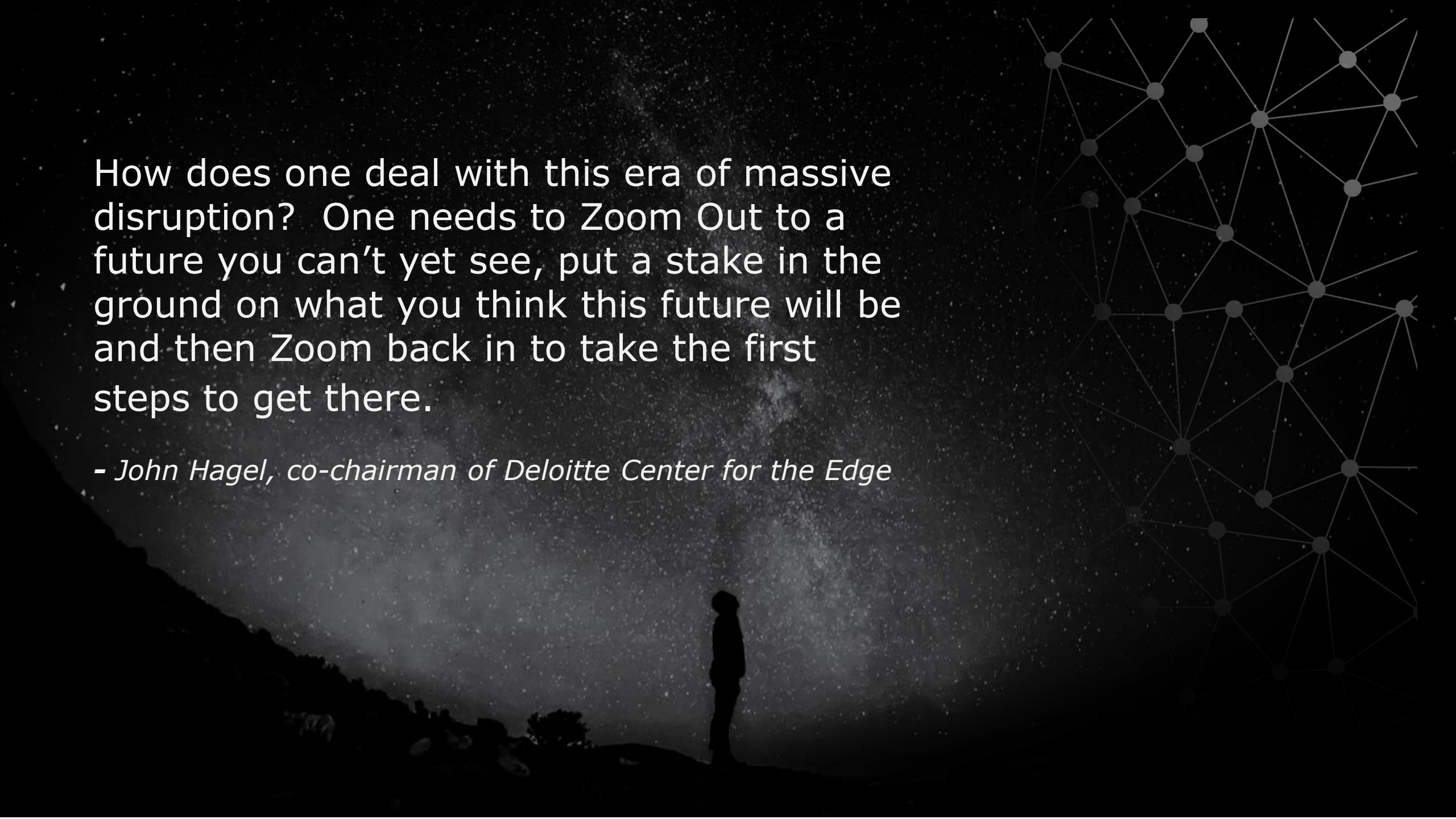
Future work options

1

WHAT?
"Work"
Automation level

3

WHERE?
"Workplace"
Physical proximity


How does one deal with this era of massive disruption? One needs to Zoom Out to a future you can't yet see, put a stake in the ground on what you think this future will be and then Zoom back in to take the first steps to get there.
- John Hagel, co-chairman of Deloitte Center for the Edge

Deloitte.

Education and Workforce Development: Texas-Japan Partnerships Preparing the Workforce of the Future

Barrett S. Caldwell

Professor of Industrial Engineering and Aeronautics & Astronautics

Bureau of East Asian and Pacific Affairs, Office of Japanese Affairs, U.S. Dept. of State

Japan-Texas Economic Summit
May 8, 2018

PURDUE UNIVERSITY

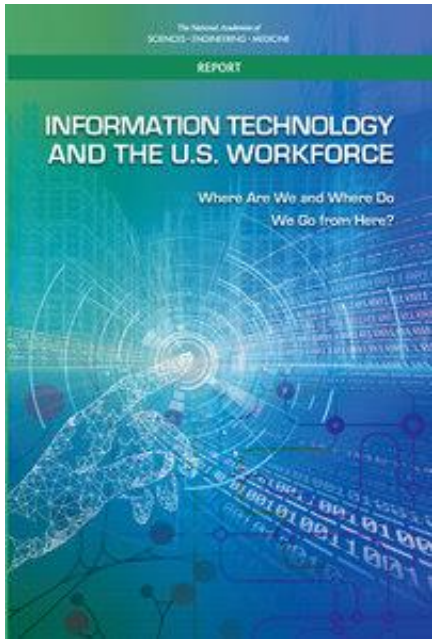
Japan-Texas Partnerships

Developing Middle-Skills and Higher-Skilled Science, Technology, Engineering and Mathematics (STEM) Workforce

- Advances in Automation and Robotics
  - Replacing, or Supporting, Human Workers?
- Aging Workers and Societies
  - Demands for higher productivity and quality
- Interactions of Hardware and Software Technology
  - Internet of things, cybersecurity, social media
  - Precision agriculture, precision medicine, secure supply chains

Increasing Opportunities for Middle-Skills STEM Workers

- Beyond High School, but Not Advanced Degrees
- Technicians, Analysts,
- Smart Factories, Advanced Agriculture, Healthcare & Services



State-Based Example: NASA Space Grant

National Space Grant College and Fellowship Program

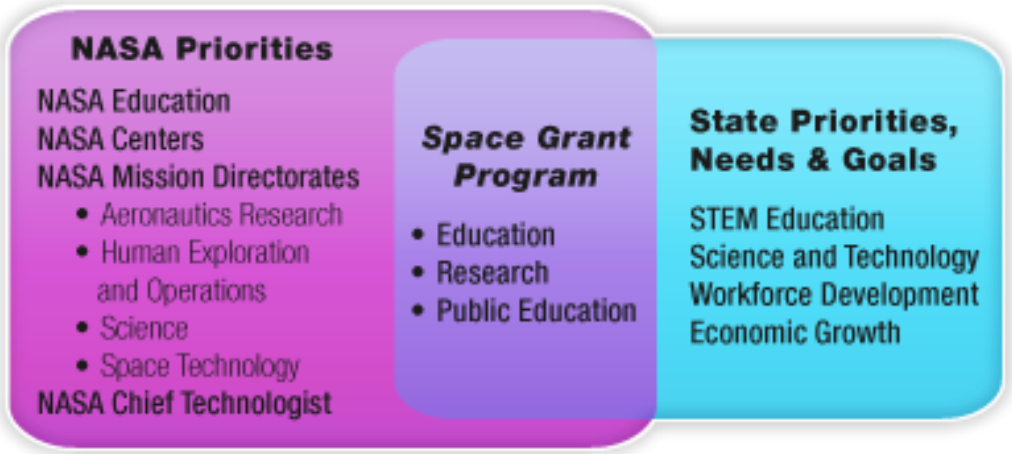
- US NASA Office of Education Program
- National Network of Colleges, Universities, Science Outreach Centres, Companies, etc.
  - > 1000 locations
  - 52 consortia (US states + DC, Puerto Rico)
- Most Directors are University Faculty in Science / Engineering Disciplines

- ***Inspiring, Recruiting, Educating Diverse Workforce Using NASA's Unique Assets and Mission***

State-Based Example: NASA Space Grant

Space Grant Activities for Middle- and Higher-Skills STEM

- FIRST Robotics (Houston Championships Apr 18-21!)
- Partnerships with Community Colleges
- Design Challenges



Undergrad Design Challenge

- College Teams of 3-6 students work on a NASA project
- Faculty Advisor and NASA Mentor provide support
- Project may last 1 or 2 semesters, Teams earn funding
- At the end of each semester, teams present their work in Houston at the Design Challenge Showcase Event
  - NASA, industry, and educator audience
  - About 10-14 teams complete each semester
  - Poster, Models, and Presentations judged and Feedback provided
  - Top Design Teams awarded Scholarships

TEXAS SPACE GRANT CONSORTIUM
DESIGN CHALLENGE

QUESTIONS?

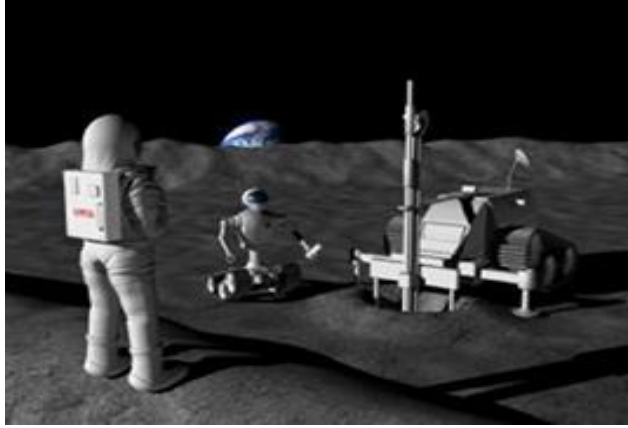
Prof. Barrett S Caldwell

- bscaldwell@purdue.edu; CaldwellBS@state.gov

- https://www.nasa.gov/offices/education/programs/national/spacegrant/about/index.html
- https://www.firstinspires.org/

- These slides represent the opinions of the author only and do not reflect official positions of any U.S. government agency.

PURDUE UNIVERSITY



Promoting Cooperation with Industry & Universities

2018.5.8

Motoko Uchitomi (Mizuno)

JAXA Aviation Industrial Collaboration and Coordination Division

内冨（水野）素子　経歴　Ms. Motoko Uchitomi（Mizuno）biography

（現職　JAXA航空技術部門　事業推進部参事・航空産業協力課長　Manager of Aviation Industrial Collaboration）

1994　東京大学法学部卒業 Graduated from UT (Bachelor of Law)
1994　旧宇宙開発事業団（NASDA）入社、企画室 （法務） ISS協定交渉、国連対応等
　　Former NASDA Policy Dept., : legal strategy & coordination for ISS, UN etc.
1997　外務省国際科学協力室出向、ISS国際協定国会批准、国際科学協力推
　　Ministry for Foreign Affairs: ISS/IGA Diet approval, international science cooperation
1999　オランダ　ライデン大学留学（2000年9月に国際法修士号取得）
　　Leiden Univ. ,The Netherlands (Master of International Law/ 2000)
2000　有人本部（ISS国内外法務＆利用促進）NASDA ISS Dept.: ISS legal coordination & promotion of utilization
2003　JAXA産学官連携部（宇宙ﾋﾞｼﾞﾈｽ促進）JAXA Industrial Cooperation Dept. : promotion of new space ventures
2007　国際部　欧米露協力とりまとめ International Relations., :coordination with US. Russia & Europe
2012　法務・コンプライアンス課長 Manager of JAXA Legal Division
2015-　航空技術部門　事業推進部　参事・航空産業協力課長　Manager of Aviation Industrial Collaboration

（本務以外の活動 Works outside of JAXA ）
東京大学非常勤講師（2010年-)、慶応大学非常勤講師（2013-14）、中小企業診断士（2010年登録）、航空宇宙学会宇宙ビジョン委員会幹事、宇宙芸術コミュニティbeyond発起人＆種子島宇宙芸術祭ｱﾄﾞﾊﾞｲｻﾞ、日本ロケット協会宙女ボード発起人
Part-time lecturer at UT(2010-), Part-time lecturer at Keio Univ. (2013-14), Small business consultant, JSASS Space Vision Committee(Secretary), space art community “beyond” (Founder), JRS Diversity for Space Committee “Sorajo” (Founder)

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Organizational Structure of JAXA & Related Government Agencies

Cabinet

Strategic Headquarters for Space Policy
(Secretariat: Cabinet Secretariat)

Cabinet Office

Council for Science and Technology Policy (CSTP)

Space Activities Commission

Council for Science and Technology /
Committee on Science and Technology for Aeronautics

Ministry of Education, Culture, Sports, Science and Technology (MEXT)

Ministry of Internal Affairs and Communications

Ministry of Economy, Trade and Industry (METI)

Ministry of Land, Infrastructure, Transport and Tourism (MLIT) / Civil Aviation Bureau

Ministry of Defense

Ministry of Environment

JAXA
Japan Aerospace Exploration Agency

R&D Directorates

- Space Technology Directorate I
- Human Spaceflight Technology Directorate
- Institute of Space and Astronautical Science (ISAS)
- Space Exploration Innovation Hub Center
- **Aeronautical Technology Directorate**
- Research and Development Directorate
- Space Technology Directorate II

Number of JAXA employees
Approx. 1,550 (220 in Aeronautics)

Budget (@1 USD=100 JPY) Approx.
✈ Overall budget: 1.54 billion USD
✈ Aeronautics: 64million USD
(FY2017)

JAXA's Aviation Research Initiatives

- 3 major R&D programs and basic research

Environment

Environment Conscious Aircraft Technology Program (ECAT)

Safety

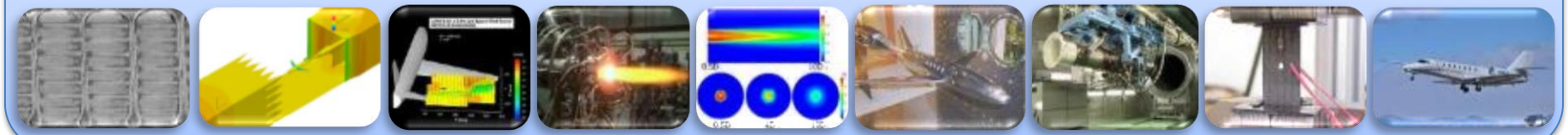
Safety Technology for Aviation and Disaster-Relief Program (STAR)

Frontier

(Sky Frontier Program)

Science & Basic Tech

Aeronautical Science & Basic Technology Research Program



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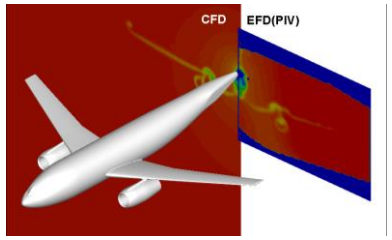
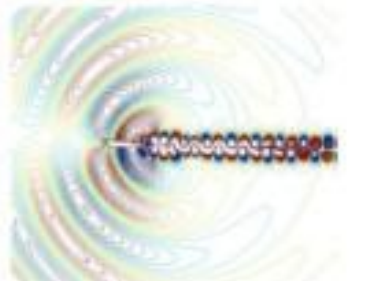
- Offering various testing facilities
- Reaching more than 100 R&D agreements/year
- Issuing research announcements
- Accepting students as RA

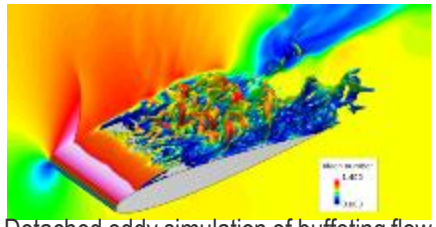
Aerodynamics



Comparison between EFD and CFD

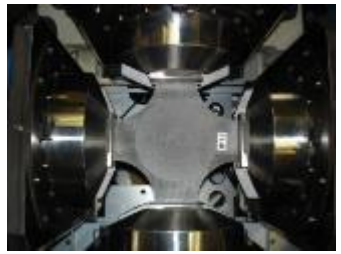

Acoustic analysis around an airfoil

Numerical Simulation


Detached eddy simulation of buffeting flow on an airfoil


Direct numerical simulation of a turbulent boundary layer with separation

Structures Research

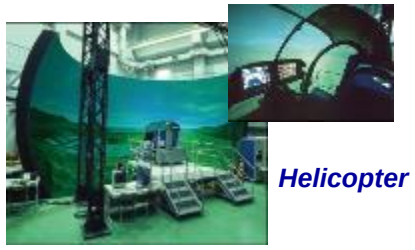

Biaxial Load Test System


Multi-axis Vibration Evaluating System

Flight Simulator

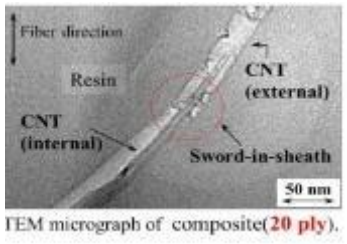

Airplane

FSCAT-A


Helicopter

FSCAT-R

Composites Research



TEM micrograph of composite(20 ply).

Experimental Aircraft


HISHO (2012)


MuPAL-α (1988)


BK117-C2 (2013)

Wind Tunnels


1 m×1 m supersonic


1.27 m hypersonic


6.5 m×5.5 m low-speed


2 m×2 m transonic

For more information: http://www.aero.jaxa.jp/eng/research/basic/

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JAXA cooperates with universities& industry to produce top level researchers for aviation technologies by offering research & educational opportunities

Academic Society

Established “Aeronautics education support Forum” with JSASS *

- Seminars for students at academic meetings
- CFD competitions
- Discussion for enhanced efficiency of educational support
  - Carrier path for students
  - Possibility of FTB utilization

*The Japan Society for Aeronautical and Space Science

universities

- Developing framework for agreements with Universities and supporting their educational activities such as sending visiting professors etc.
- Recruiting graduates as research assistant (RA)
- Accepting more than 300/year university students as trainees (160/year for Aviation Directorate)
- Making agreements with 30 universities & tech colleges to provide CFD tools for education
- Advising flight experiment program for students by universities (sponsored by MEXT)

Local Gov. & Industry

+education & training support for industry (request basis)

- **Agreement with Aichi Pref.**
- **Collaboration with industry associations (e.g. JASTEC)**
  - **Seminars**
  - **Experimental opportunities**

Nagoya Flight Research Center

JAXA Space Education Center
Main Activity Areas

Formal Education Support

Assisting development of teaching plans, as well as teaching and learning materials in classrooms

Informal Education Support

Developing unique programs for various levels of primary and secondary school students to learn in a progressive manner

Home Education Support

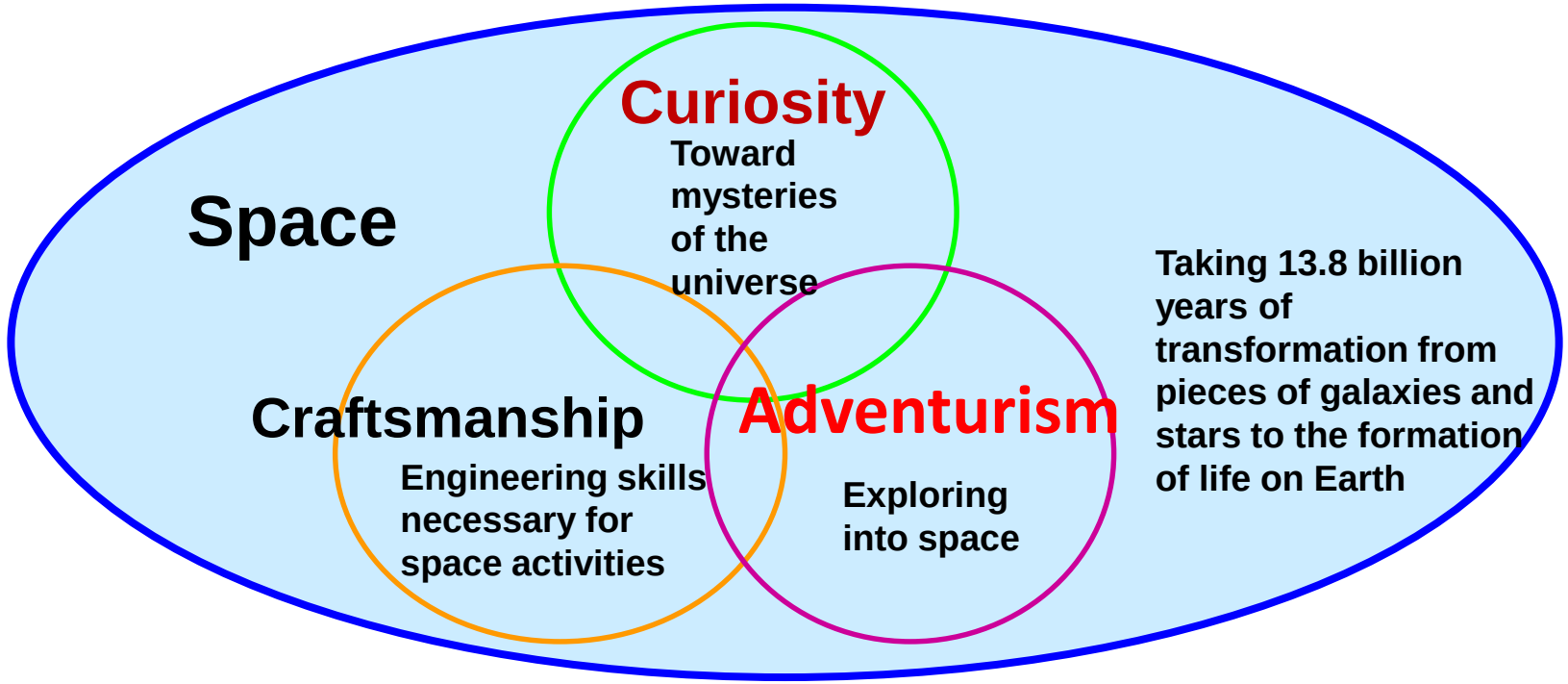
Developing education materials for parents and children to conduct simple experiments at home

International Activities

Collaborating within the frameworks of ISEB and APRSAF

WORKING ON CHILDREN'S MINDS

"SPACE = Unique source of interest, imagination & inspiration."



Space Education → Stimulating Children's curiosity toward nature, universe and life while stressing the preciousness of life → Human Development through Space

Overview of UNISEC-Japan

- UNISEC: “University Space Engineering Consortium”
  - UNISON: UNISEC Student Organization
  - UNISAS: UNISEC Alumni Organization
- Established in 2002
- NPO/NGO to facilitate/promote university level students’ practical space development activities, such as designing, manufacturing and launching small satellites and hybrid rockets.
- 74 laboratories/groups from 52 universities
- 955 student members, 270 individual supporters, and 15 corporate supporters (as of April, 2018)
- 3 pillars: Human resource development, Technological development, Outreach

UNISON
unisec student organization

UNISEC-Global

- **UNISEC-Global** is an **international nonprofit, non-government organization**, consisting of local-chapters across the world. *Points of Contact in 45 regions and 15 Local Chapters (LCs)/2018
- Since its **establishment in November 2013**, it has provided an annual forum, training programs, competitions.

- **Training Program**
  - CanSat Leader Training Program (CLTP)
- **Competition**
  - Micro/Nano Satellite Mission Idea Contest (MIC)
  - Debris Mitigation Competition (DMC)
- **Conferences, workshops, and meetings**
  - UNISEC-Global Meeting
  - Nano-satellite Symposium

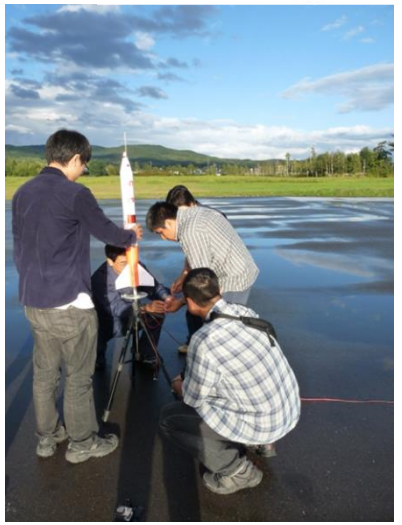
CanSat Leader Training Program (CLTP)

Objective: CLTP is a training program for professors/instructors to learn how to conduct CanSat training by experiencing it. Participants are expected to teach their students after training. It has contributed to capacity building in basic space engineering and technology.

Launched: October 2010

Offered: Annually

Graduated: 73 participants from 34 countries



Launch Experiment

CanSat Manufacturing

Vibration Test

Paper craft Rocket

Indices for Measurement of Gender Equality (HDI, GII, and GGI)

HDI (188 countries) (Human Development Index)			GII (159 Countries) (Gender Inequality Index)			GGI (144 Countries) (Gender Gap Index)		
	Country	Score		Country	Score		Country	Score
1	Norway	0.949	1	Switzerland	0.040	1	Iceland	0.878
2	Australia	0.939	2	Denmark	0.041	2	Norway	0.830
2	Switzerland	0.939	3	Netherland	0.044	3	Finland	0.823
4	Germany	0.926	4	Sweden	0.048	4	Rwanda	0.822
5	Denmark	0.925	5	Iceland	0.051	5	Sweden	0.816
5	Singapore	0.925	6	Norway	0.053	6	Nicaragua	0.814
7	Netherlands	0.924	7	Slovenia	0.053	7	Slovenia	0.805
8	Ireland	0.923	8	Finland	0.056	8	Ireland	0.794
:	:		:	:	:	:	:	
17	Japan	0.903	21	Japan	0.116	114	Japan	0.657

Source: HDI and GII from "Human Development Report 2016," United Nations Development Programme (UNDP), GGI from "Global Gender Gap Report 2017," World Economic Forum

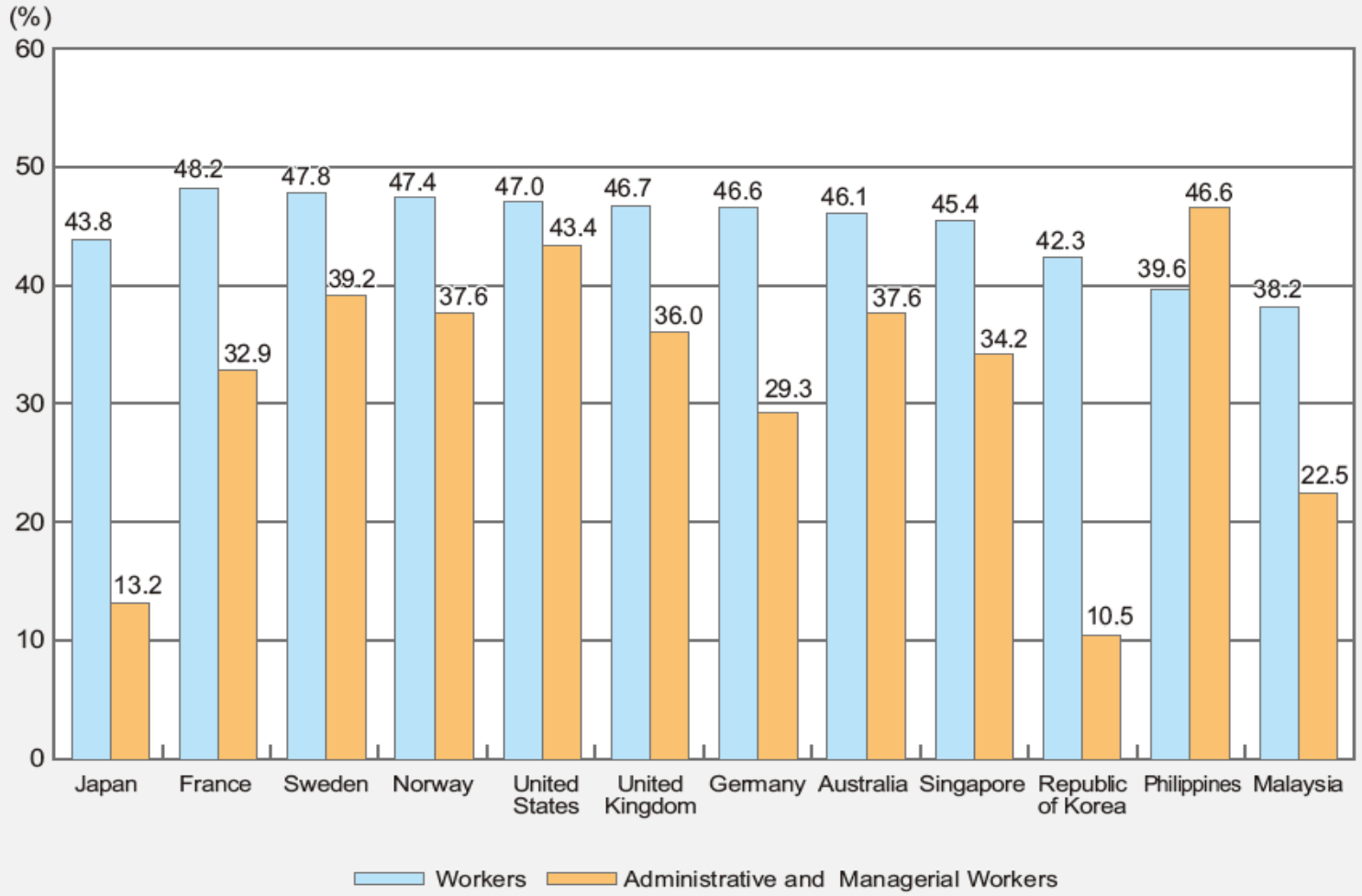
Note:

1. The Human Development Index (HDI) is a summary measure of achievements in key dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living. The HDI is the geometric mean of normalized indices for each of the three dimensions.
2. The Gender Inequality Index (GII) reflects gender-based disadvantage in three dimensions—reproductive health, empowerment and the labour market. It shows the loss in potential human development due to inequality between female and male achievements in these dimensions.
3. The Gender Gap Index (GGI) measures the gap between men and women in four fundamental categories (sub indexes): Economic Participation and Opportunity, Educational Attainment, Health and Survival and Political Empowerment.

※Data from web page of Gender Equality Bureau, Cabinet Office

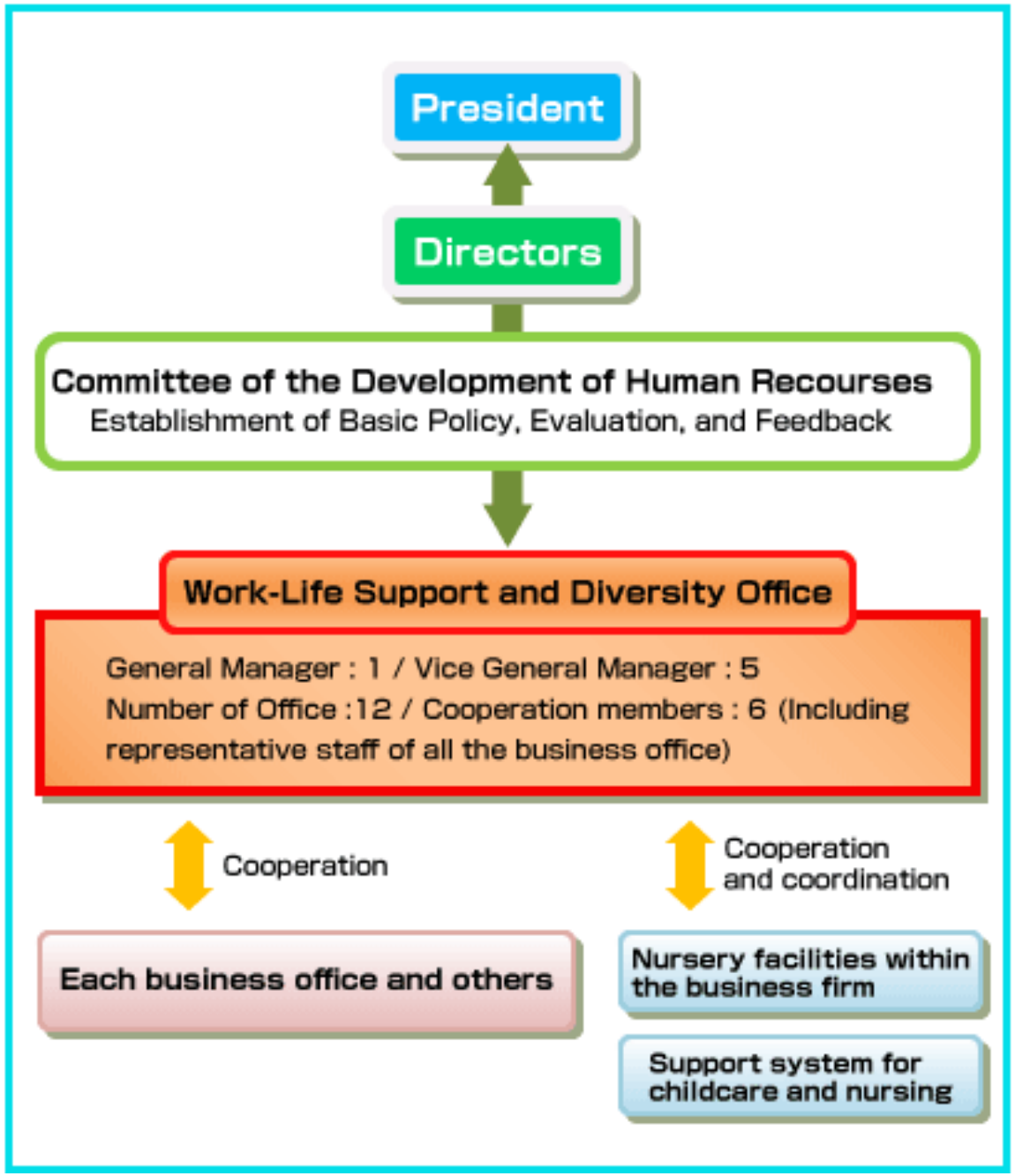
Proportion of Female Workers and Female Administrative/ Managerial Workers

The proportion of female administrative and managerial workers in Japan is lower than other countries.



Note:
1. Created from "Labour Force Survey (Basic Tabulation), 2017" by the Ministry of Internal Affairs and Communications and "ILO STAT."
2. Data of Japan is as of 2017; data of Australia is as of 2014; data of US is as of 2013; data of other countries are as of 2015.
3. "Administrative and Managerial Workers" include company officers, company management staff, and management government officials among workers. Definition of administrative and managerial workers varies across countries.

※Data from web page of Gender Equality Bureau, Cabinet Office



A wide range of networking both within and outside Japan

- Universities, independent corporations, and other institutions related to space aeronautics
- Business firms related to space aeronautics
- United Nations(UN COPUOS)
  International Astronautical Federation(IAF)
  European Space Agency (ESA)
  Asia-Pacific Regional Space Agency Forum (APRSAF) and other institutions
- NASA(USA), DLR(Germany), CNES(France) and other foreign institutions

Cooperation

Area(local municipalities, NPOs, and other institutions)

Promotion of gender equality (from FY 2013 to FY 2015)

Project Supporting Female Researchers (subsidy program by Ministry of Education, Culture, Sports, Science and Technology)

■ Specific Measures

A. Ensure a secure environment for giving birth, raising children, and caring for sick/elderly family members.
B. Restructure work environment to ensure work-life balance.
C. Improve capacities for research and development as well as for managing a group.
D. Expand recruitment and appointments and increase awareness of such efforts.
E. Visualize role models.Increase opportunities for interaction with female graduate and undergraduate students.
F. Construct networks for internal, external, and mutual collaborations.

＋

Original projects by JAXA

Implementing above-mentioned measures among all employees (including non-researchers and males)

Work-Life Support and Diversity Office
Efforts toward promoting gender equality and diversity (from FY 2016)

■ Increasing recruitment and appointments of females and increasing awareness about these efforts
■ Specific measures for all employees
1. Ensure a secure environment for giving birth, caring for children, and caring for sick/elderly family members.
2. Restructure work environment to ensure work-life balance.
3. Improve capacities for research and development as well as for managing a group.

Conducting training sessions and seminars
Participation in training sessions and seminars conducted by external organizations

■ Basis for supporting implementation of the measures
1. Transmitting information on results of activities, "best practices," etc.
Operating a website, publishing a magazine
2. Constructing networks for internal, external, and mutual collaborations
Attending related international and national conferences
3. Collecting data for supporting implementation of the measures, introducing national and international "best practices"
Preparing statistical data and various investigations

The Act on Promotion of Women' s Participation and Advancement in the Workplace

Basic Act for a Gender Equal Society

The Promotion Plan of Telework by Ministry of Internal Affairs and Communication

Basic Pan for Gender Equality

An employee-friendly workplace in which one can freely demonstrate his/her abilities

Contribution to the field of aerospace through promoting innovations

Bringing More Diversity in Japan's Aerospace Industry -voluntary team *"Sorajo"* based in Japanese Rocket Society-

- Hosting seminars and networking events for professional women (and men as supporters) and the next generation in association with academic society and industry
- Collaborating with WIA

©Kimiyo Hyashi

SA Works

SA Works, housed under SAEDF, is an industry-led workforce organization aligning San Antonio's education providers and private sector to promote economic mobility.

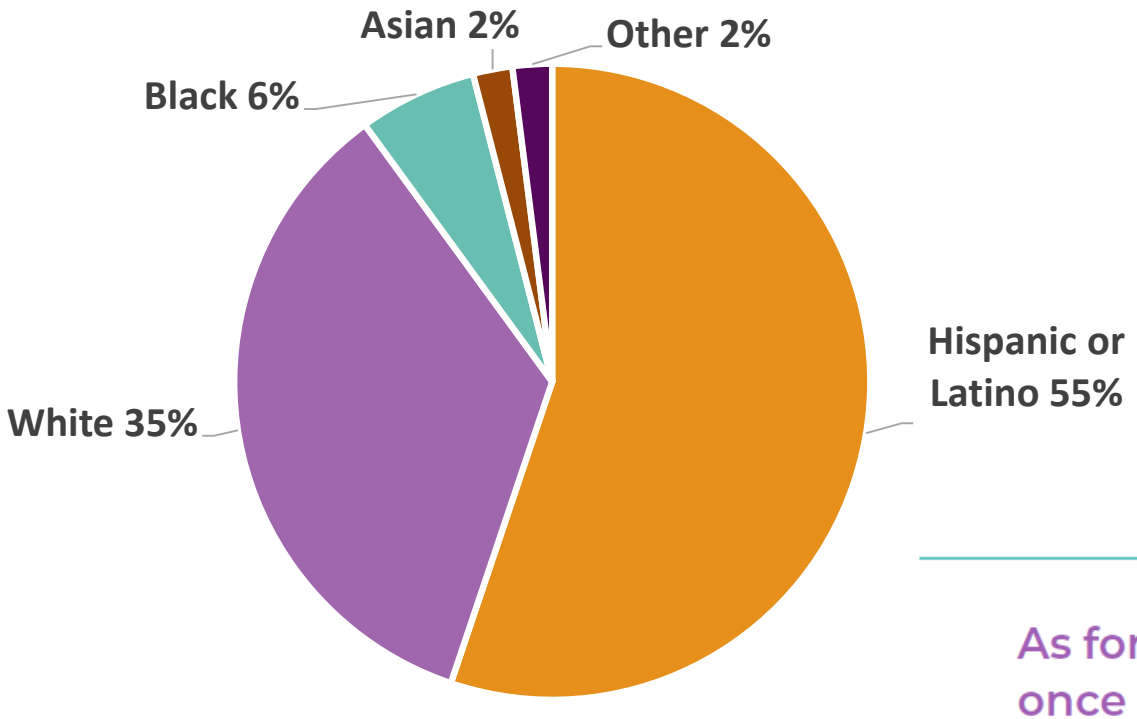
Explosive Growth & Momentum

- **Explosive Growth**
  - Population of 1.4m expected to double by 2040
  - 7th Largest City in the U.S. (5th by 2030)

- **Quality of Life**
  - #2 for Millennial Population Growth – Business Insider
  - Top 10 Cities in the U.S. for Tech Jobs – Entrepreneur Magazine
  - #1 U.S. Metro with the most 'Brain Gain' – Brookings Institute
  - #1 "Best City for Young Grads" – Forbes
  - Top Creative City for Gastronomy – UNESCO

- **Ideal Business Climate**
  - A pro-business local government that values growth
  - Only large U.S. city (1m+) with AAA bond rating
  - Competitive cost of living, 12% less than U.S. average
  - Affordable land, energy and water

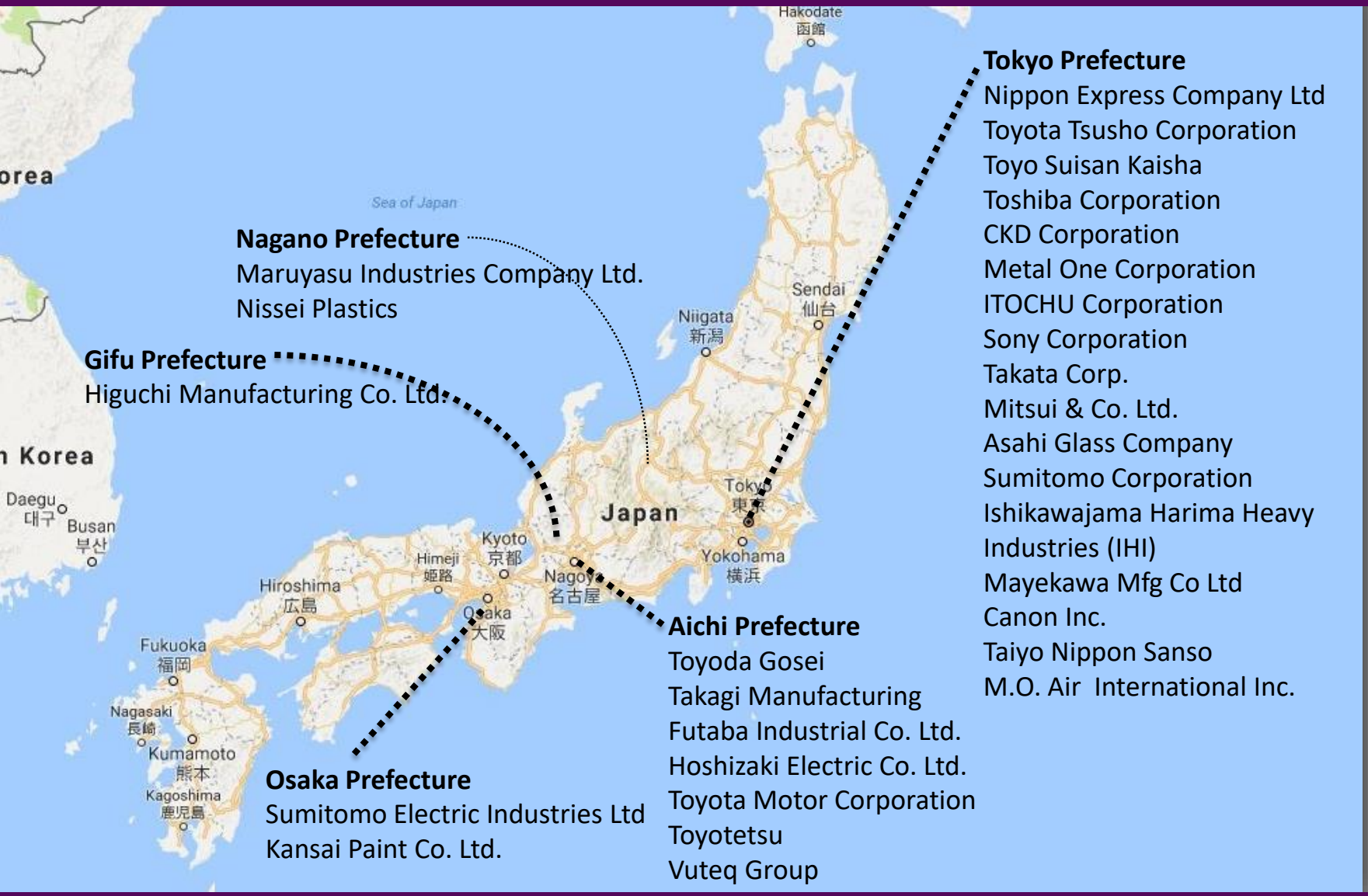
Demographic Snapshot



> As former head of the U.S. Census Bureau, Stephen Murdoch once said, 'If you want to see what the future will look like in the U.S., look to San Antonio.' The country will one day become as multicultural, young, and tolerant as we are today.

Strategic Framework

Our Relationship with Japan



Nagano Prefecture
Maruyasu Industries Company Ltd.
Nissei Plastics

Gifu Prefecture
Higuchi Manufacturing Co. Ltd.

Tokyo Prefecture
Nippon Express Company Ltd
Toyota Tsusho Corporation
Toyo Suisan Kaisha
Toshiba Corporation
CKD Corporation
Metal One Corporation
ITOCHU Corporation
Sony Corporation
Takata Corp.
Mitsui & Co. Ltd.
Asahi Glass Company
Sumitomo Corporation
Ishikawajama Harima Heavy Industries (IHI)
Mayekawa Mfg Co Ltd
Canon Inc.
Taiyo Nippon Sanso
M.O. Air International Inc.

Aichi Prefecture
Toyoda Gosei
Takagi Manufacturing
Futaba Industrial Co. Ltd.
Hoshizaki Electric Co. Ltd.
Toyota Motor Corporation
Toyotetsu
Vuteq Group

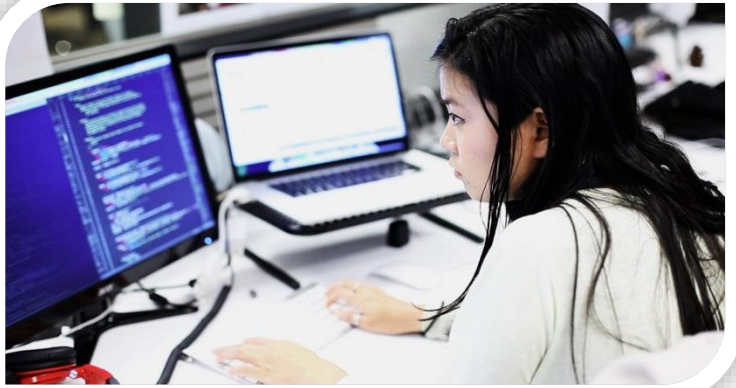
Osaka Prefecture
Sumitomo Electric Industries Ltd
Kansai Paint Co. Ltd.

37+
Japanese companies in San Antonio today

Japanese City of Kumamoto Sister City with San Antonio

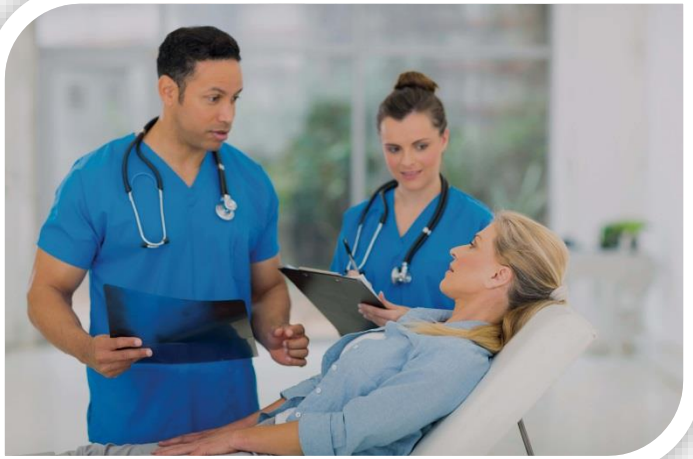
Naoko Shirane Foundation: Summer Study Tour of Japan for children of employees of TMMTX and suppliers

Challenge: Middle Skills Jobs Not Being Filled



Healthcare

2 posted job openings for every 1 healthcare graduate in San Antonio*



Information Technology

10 posted job openings for every 1 IT college graduate in San Antonio*

Manufacturing

Nationally over the next decade, projected 3.4 million job vacancies with 2 million that will go unfilled **

*SA2020 Talent Pipeline Report **The Manufacturing Institute

Our Guiding Principles

GUIDING PRINCIPLE:

Meet Employer Demand

GROWING

Our Talent (K-12)

UPSKILLING

Incumbent Workers

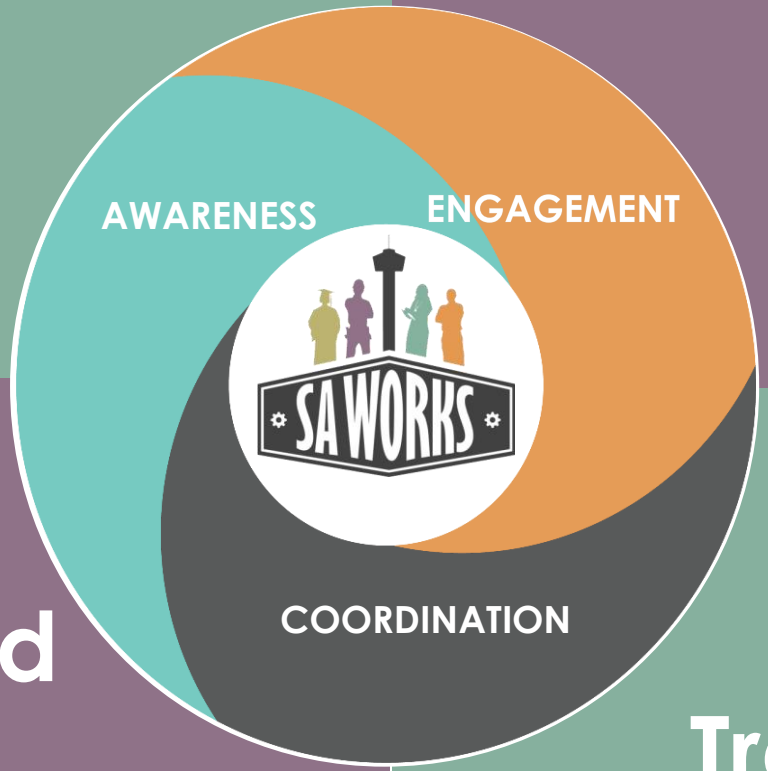
RECRUITING & RETAINING

Talent that is Hard to Find Locally

Education and Workforce Ecosystem

Education Partners

Industry Partners



Community-Based Organizations

Workforce & Training Partners

Cultivating Our Talent

Job Shadow Day

One day event to provide students exposure to various companies across Bexar County. The companies participating in the city-wide Job Shadow Day planned for months to provide a combination of meaningful and informative activities.

Job Shadow Day exposes students to:

- company culture and values
- career opportunities in diverse industries
- technical and marketable skills needed in the workplace

Teacher Externships

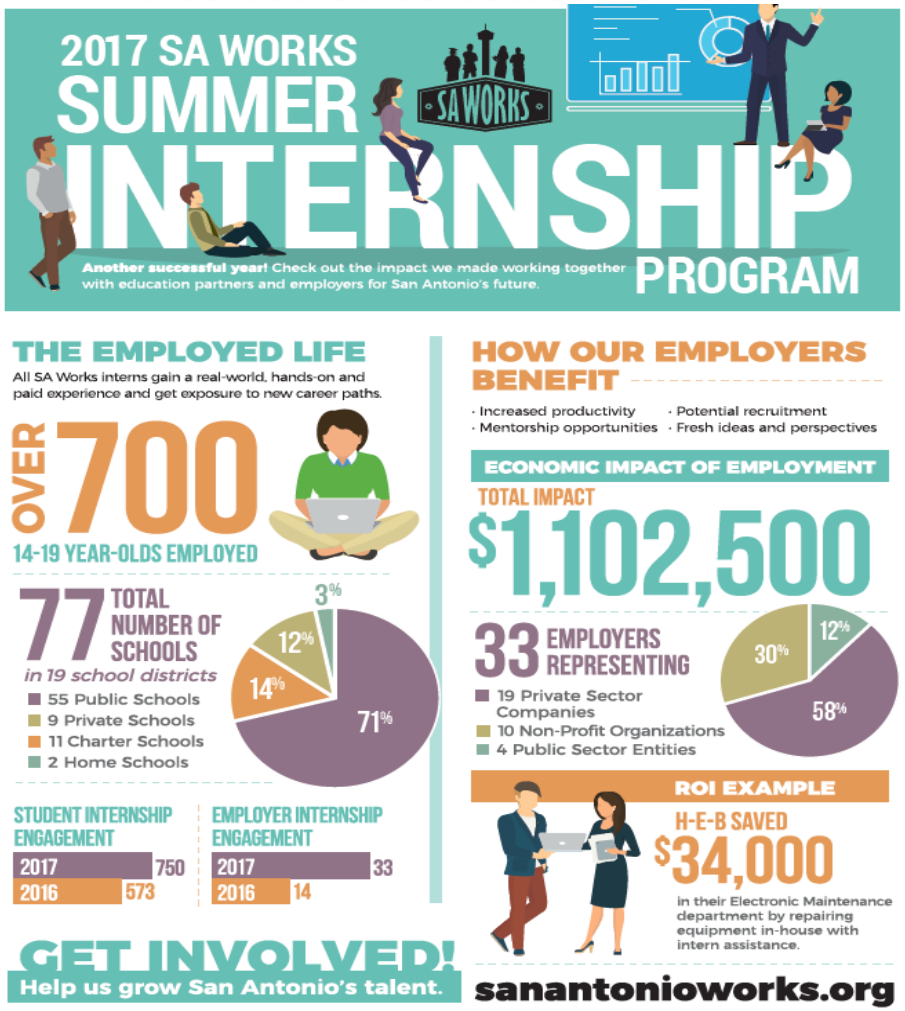
Teacher Externships provide opportunities for educators to learn how math and science is applied in the work place with one-week summer sessions that include employer visits and creation of project-based-learning lessons. The Externships for Teachers Project in San Antonio is carried out by the Alamo STEM Workforce Coalition (ASWC). ASWC member organizations include:

- Workforce Solutions Alamo (WSA)
- The Alliance for Technology Education in Applied Math and Science (ATEAMS)
- Education Service Center, Region 20 (ESC-20)
- The University of Texas at San Antonio (UTSA) Academy for Teacher Excellence (ATE)

Affiliated partners include: San Antonio Chamber of Commerce and P16Plus Council

Cultivating our Talent

Summer Jobs for High School Students



Mayor's Call to Action

Cultivating Our Talent: TMMTX

TMMTX Community Engagement

Education & Workforce

Comprehensive Strategy

Long Term

- PreK4SA
- BiblioTech
- PREP
- Core 4 STEM
- FIRST Robotics

Mid Term

- Alamo Academies
- AMT Program
- Solar Car
- Electric Car
- Scholarships
- FIRST Robotics

Short Term

- GED Program
- Military Hiring
- Career Technologies Education (CTE)

BIBLIOTECH · Southwest · FIRST · HIRING OUR HEROES · SOMERSET ISD · ALAMO COLLEGES

TMMTX Community Engagement

Education & Workforce

SCHOLARSHIPS

- Toyota Texas STEM Teacher Scholarship
- MBKSA Scholarship (My Brothers Keeper San Antonio)
- MLK Scholarship
- GED Programs
- Athlete to Teacher Scholarships (in progress)

Cultivating Our Talent: TMMTX

TMMTX High School Internship Program

Now in our 6th Summer cohort

2017 Alamo Academies Summer Interns

Students are exposed to three Career Paths:

Engineering

Multi-Skill Maintenance

Production

ALAMO ACADEMIES

$1.7 Million

TOYOTA USA FOUNDATION
Investing in a smarter tomorrow.

CAST
The Center for Applied Science and Technology
Real Dreams. Real Futures.

HANNAH WHISENANT / RIVARD REPORT
Southwest High School's engineering team tests a robot on stage after Southwest ISD received a $1.7 Million Grant from Toyota USA Foundation.

Upskilling Incumbent Workforce

Increased Awareness of Manufacturing Outreach & Recruitment → Cultivating & Upskilling Talent → RESULTS: Increased AMT Enrollment with New & Incumbent

About the AMT Program:

- **College:** Classroom instruction will be offered at the St. Philip's College Southwest Campus in subjects including electricity, fluid power, mechanics, fabrication, and robotics. Your commitment is to fully attend to your class and work schedule every week.
- **Work:** You will work at the sponsoring employer job site during the week managing, maintaining, and repairing their high tech industrial robots, conveyance systems and other technical and mechanical systems.
- **College and Work:** You will earn a competitive salary to ensure that you are able to make a living wage to pay for college and expenses. Employers will accommodate your weekly work hours to ensure you are attending college.

H-E-B TAKATA CPS ENERGY TOYOTA Texas TTTX Toyotesu Texas, Inc. CATERPILLAR

School-to-Career Program Success

JOB SHADOW

2017

3,000+

Employers-107

30-Returning, 77-New

2016

1,700

Employers-59

STUDENT INTERNSHIPS

2017

700

SA Works Employers-33

21-Returning, 12-New

2016

573

SA Works Employers-14

2-Returning, 12-New

TEACHER EXTERNSHIPS

2017

194

Employers-40

21-Returning, 19-New

2016

151

Employers-29

20-Returning, 9-New

ECONOMIC IMPACT OF STUDENT EMPLOYMENT

TOTAL IMPACT **$1,102,500**

REAL AND READY