Developing a New International Training Program for the Thirty Meter Telescope

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2016 TMT Forum, Kyoto

Today

- Akamai Program
- TIO workforce & workforce development
- Update on developing an TIO international training program

Why TIO is partnering with ISEE to Develop a workforce development program

Center for Adaptive Optics (CfAO)

Directors: Jerry Nelson; Claire Max

CfAO's education and workforce development program became

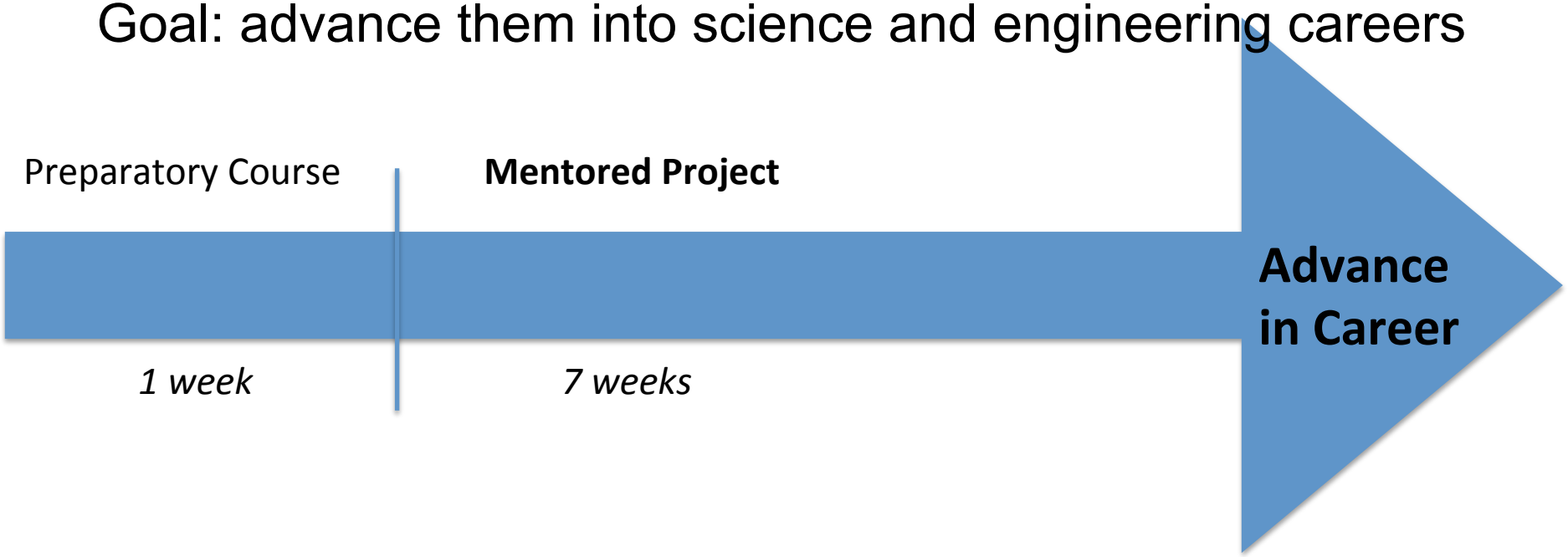
Institute for Scientist & Engineer Educators (ISEE)

15+ years of partnering with telescopes

https://akamaihawaii.org

Akamai Internship Program

Summer experience for Hawaii college students
Goal: advance them into science and engineering careers



Student participants (all from Hawaii, n=329):

- 25% Native Hawaiian
- 47% Underrepresented minorities
- 36% Women

2016 cohort: 14 of 30 (47%) of Native Hawaiian ancestry

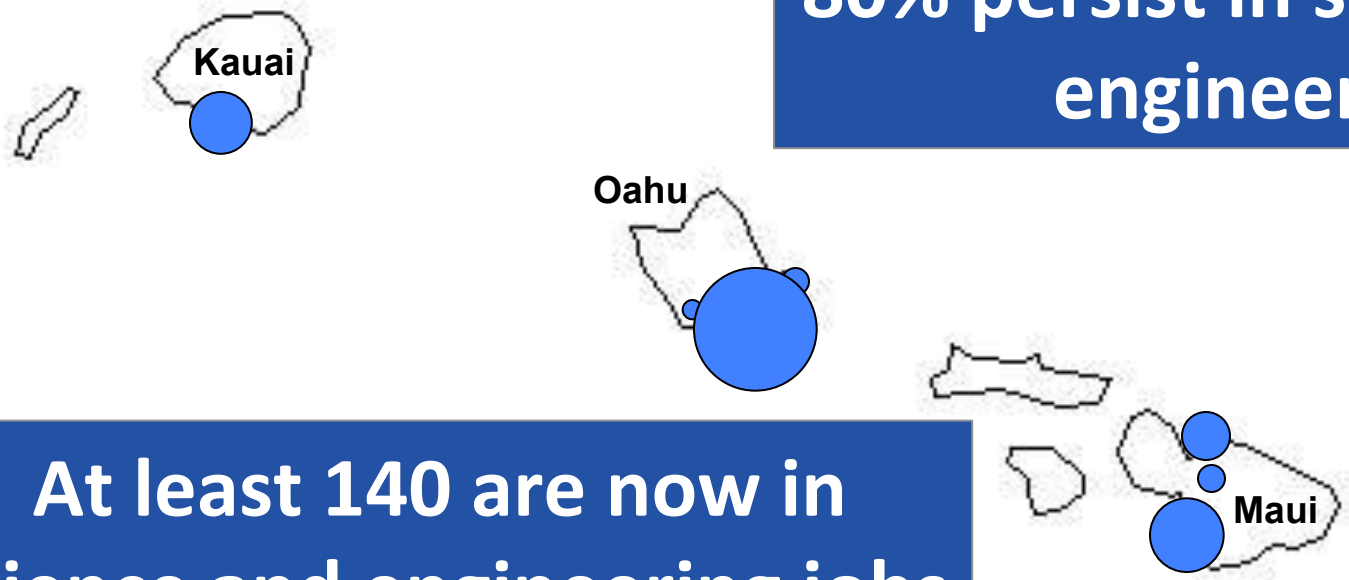
Akamai Internship observatories and companies and number of interns hosted, 2003-2016

W.M. Keck Observatory	35
Institute for Astronomy, Maui	33
Gemini Observatory	30
Trex Enterprises	23
Akimeka	22
Smithsonian Submillimeter Array	22
Subaru Telescope	20
Institute for Astronomy, Hilo	16
Oceanit	14
Pacific Disaster Center	13
Canada France Hawaii Telescope	13
Hnu Photonics	12
Textron Systems	11
UH Hilo	10

MHPCC	9
Pacific Defense Solutions/IAI	7
TMT International Observatory	6
Natural Energy Lab of Hawaii	6
NSO/DKIST	5
PJITC/2C4	5
Air Force Research Laboratory	4
Boeing	4
Northrop Grumman	4
Big Island Abalone Farm	3
PISCES	2
UH Maui College	2
Makani Kai	2
Cellana	2

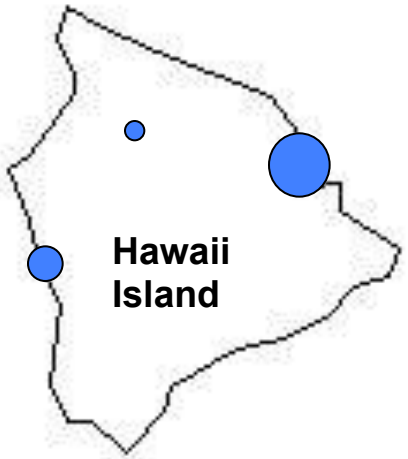
With 2016 cohort: 329 students

80% persist in science and engineering



At least 140 are now in science and engineering jobs

31 alumni on U.S mainland



● = 1 alumni ● = 10 alumni

2 alumni in international jobs

Funding for Akamai

Current:

Thirty Meter Telescope International Observatory

Air Force Office of Scientific Research (AFOSR) (FA95501510427)

Hawaii STEM Learning Partnership at Hawaii Community Foundation (9 funders, including **THINK Fund** and Maunakea Fund)

Daniel K. Inouye Solar Telescope

National Science Foundation (NSF) NSF AST-1347767 (PI Hunter), AST-1412851- (PI Max)

National Solar Observatory

University of Hawaii, Hilo (housing)

Canada-France-Hawaii Telescope (housing)

TMT has become cornerstone funder

Past:

University of Hawaii system

AFOSR(FA9550-10-1-0044)

AFOSR (via NSF AST-0710699)

NSF AST-0836053

NSF AST-0850532

NSF AST-0710699

NSF Science and Technology Center program: CfAO, AST-9876783

Akamai interns are speaking up about TMT and programs TMT supports, like Akamai

YouTube JP

Brialyn TMT

Filters

Interview with Brialyn Onodera: Hawaiian TMT Supporter

Yes2TMT

2 days ago • 55 views

We talked with **Brialyn** Onodera, a mechanical engineering student a Akamai Workforce Initiative participant, and ...

NEW

Hawaiians Support TMT

by Yes2TMT

Showing my support for the Thirty Meter Telescope

Interview with Kirstin Kahaloa: Hawaiian TMT Supporter

View full playlist (5 videos)

Today

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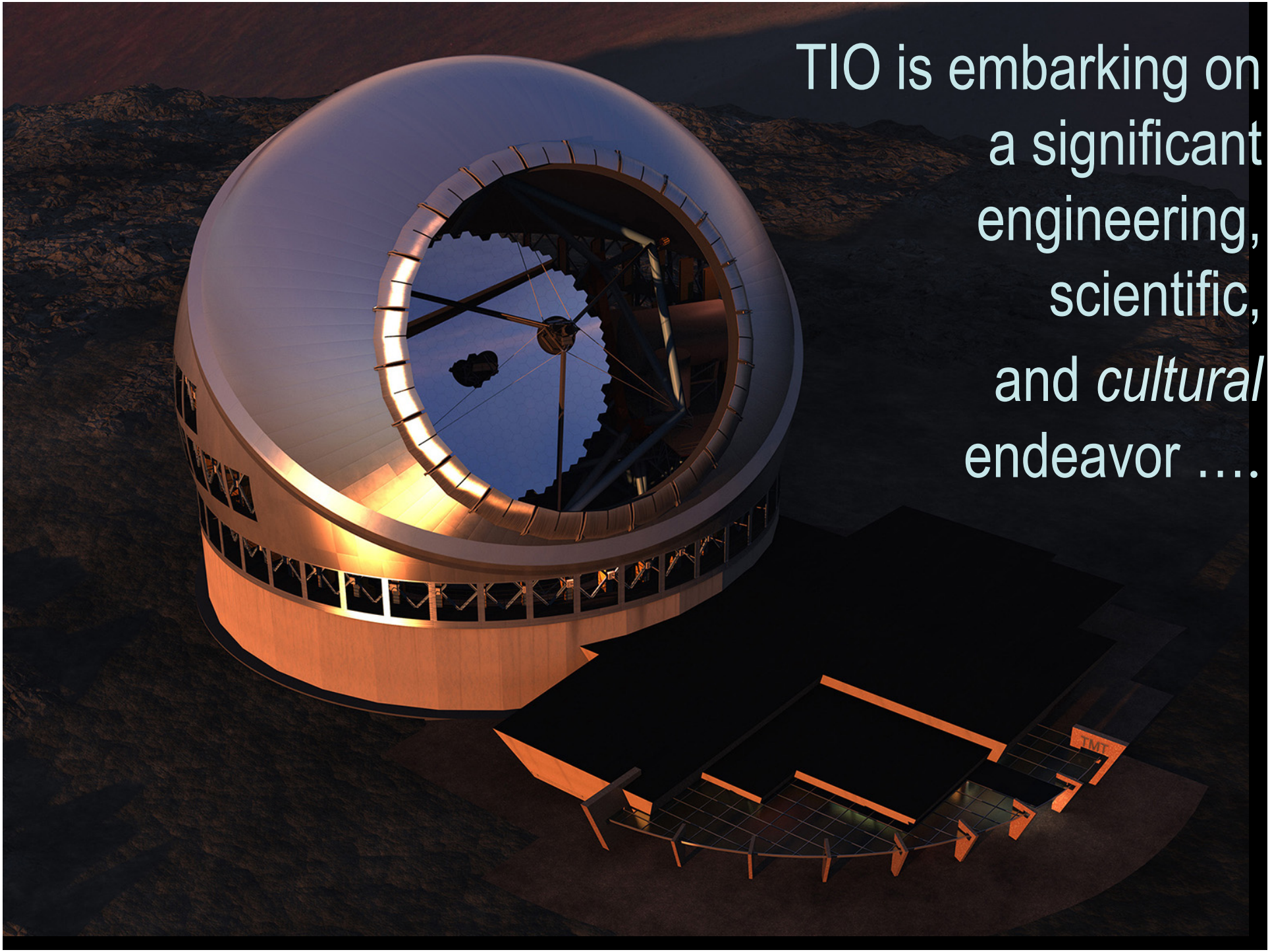
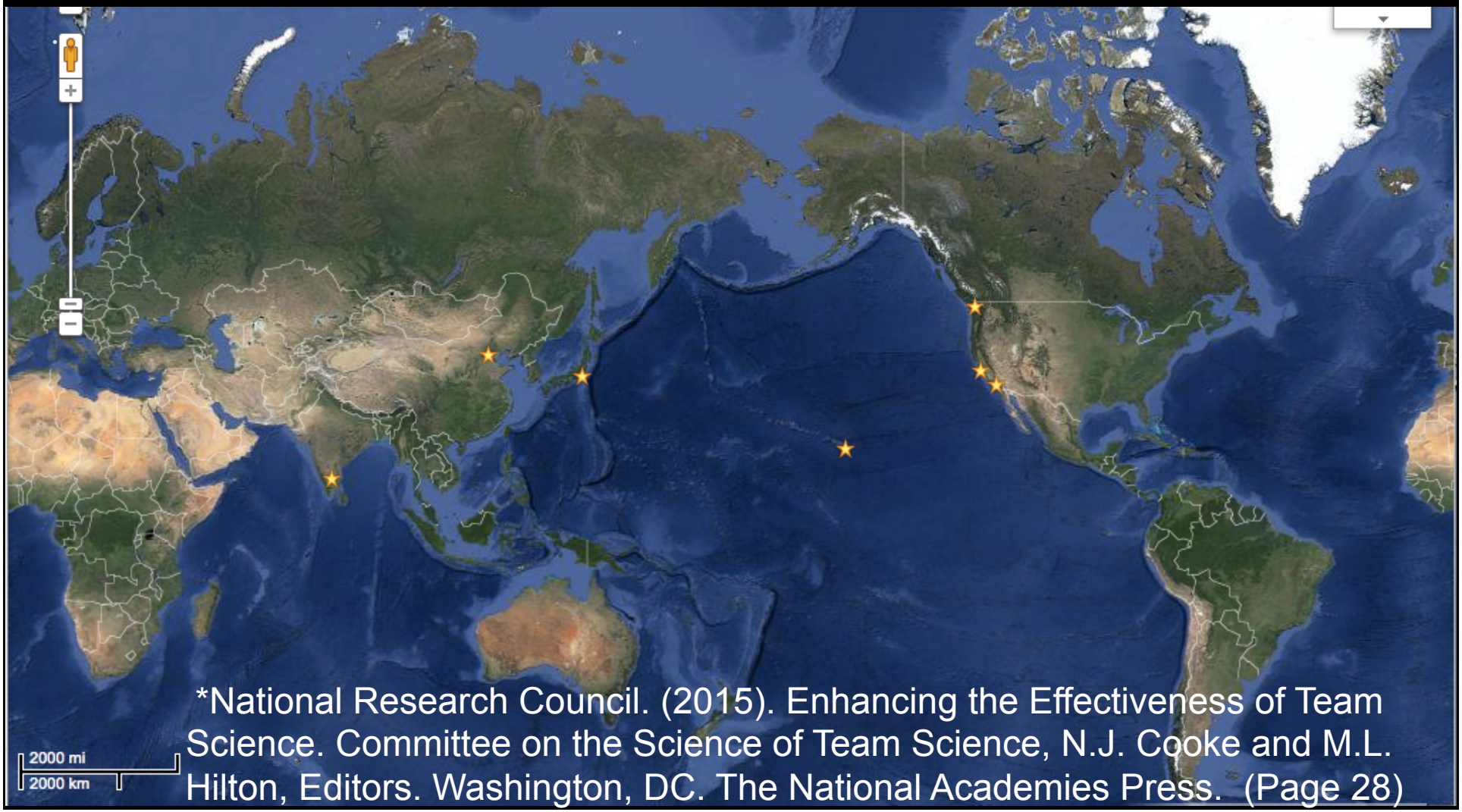

TIO is embarking on
a significant
engineering,
scientific,
and *cultural*
endeavor ….
TMT

…while also developing the most diverse astronomical community ever formed

Geographic dispersion of the TIO partnership: Challenges imposed by distance and cultural differences are notable even amongst those who study "team science."*



*National Research Council. (2015). Enhancing the Effectiveness of Team Science. Committee on the Science of Team Science, N.J. Cooke and M.L. Hilton, Editors. Washington, DC. The National Academies Press. (Page 28)

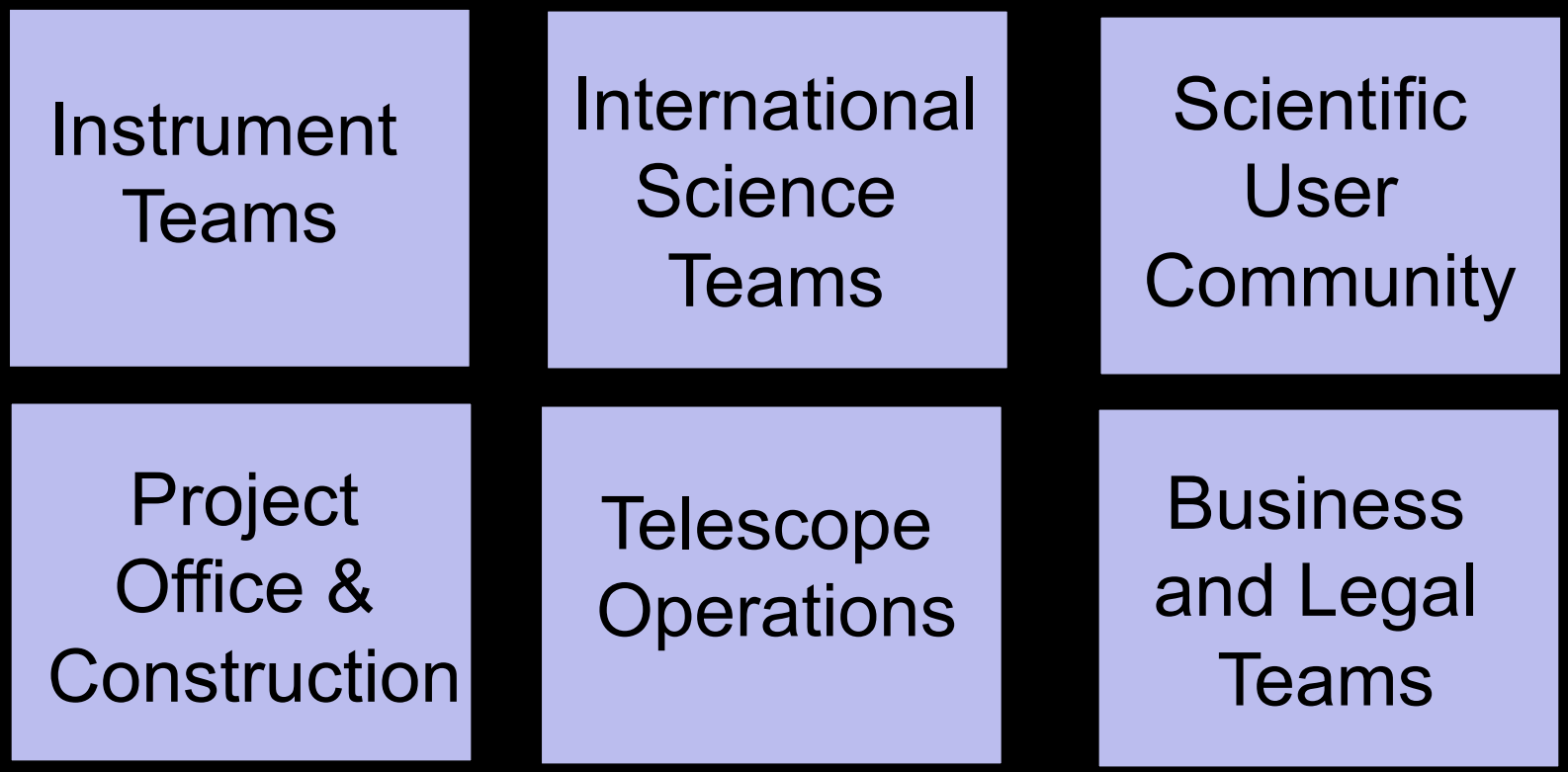
Workforce challenges and opportunities

Full participation of all partners is essential to maximizing the scientific output of TMT – now and into the future

TMT is a unique opportunity to train tomorrow's scientific and technical leaders

ISEE is working with the TMT community to develop a workforce development program to support the TMT partnership

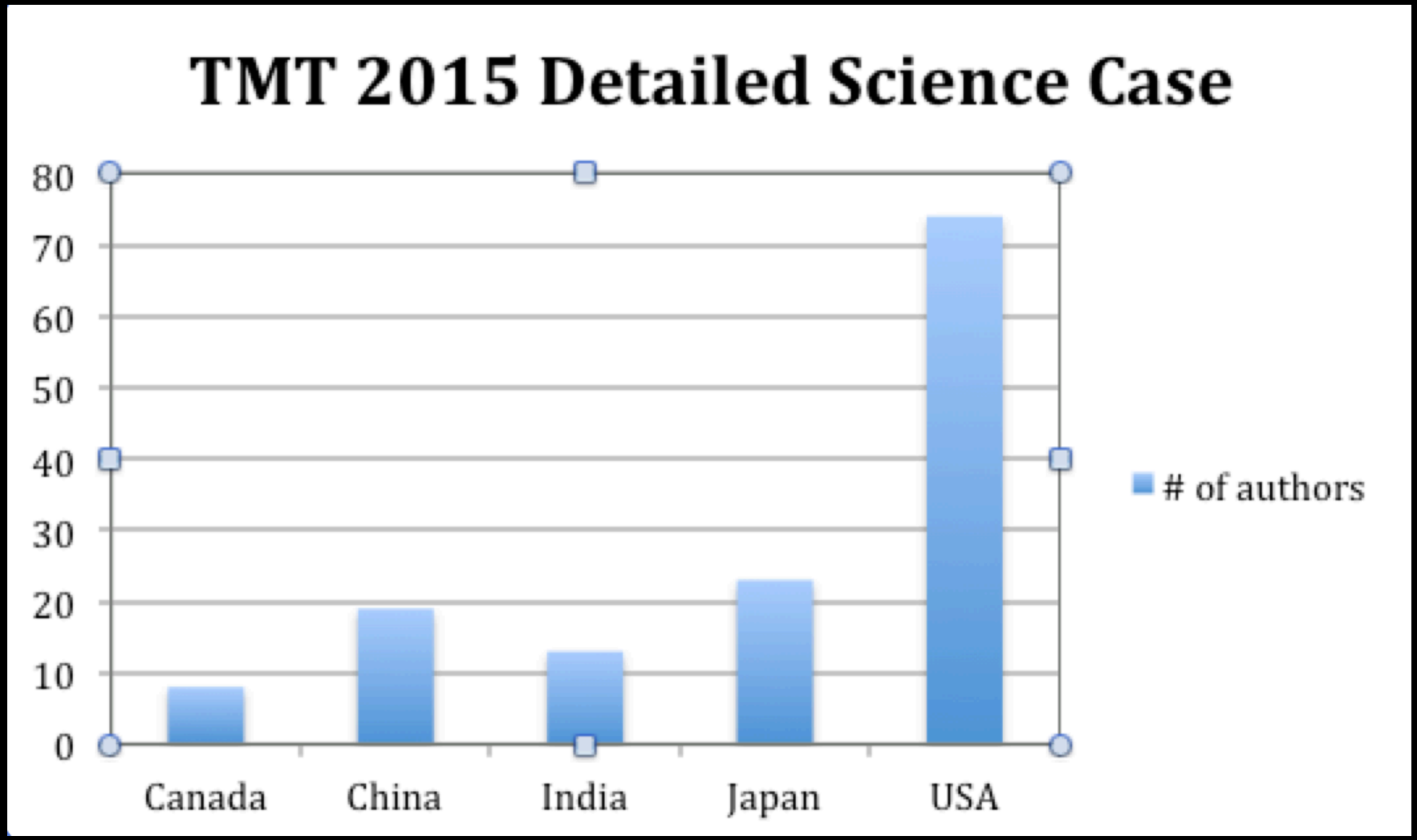
TMT's Current and Future Workforce



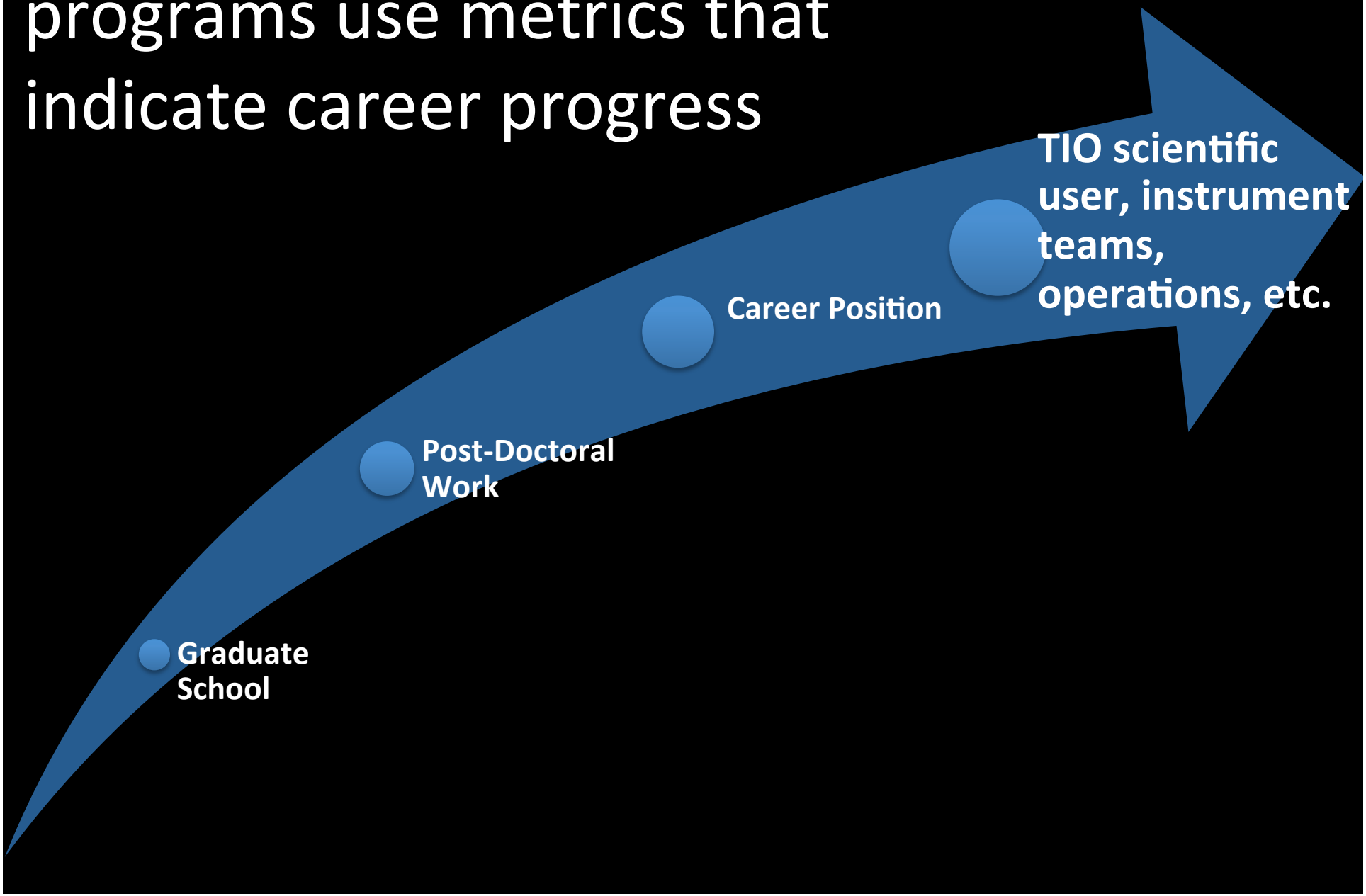
Workforce Development

- A means of training today's undergraduates, graduate students, and postdocs to be fully prepared for their career positions
- Fill gaps in skills, provide experiences and networking opportunities
- Outcomes metrics
  - Career milestones of individuals
  - Composition of workforce

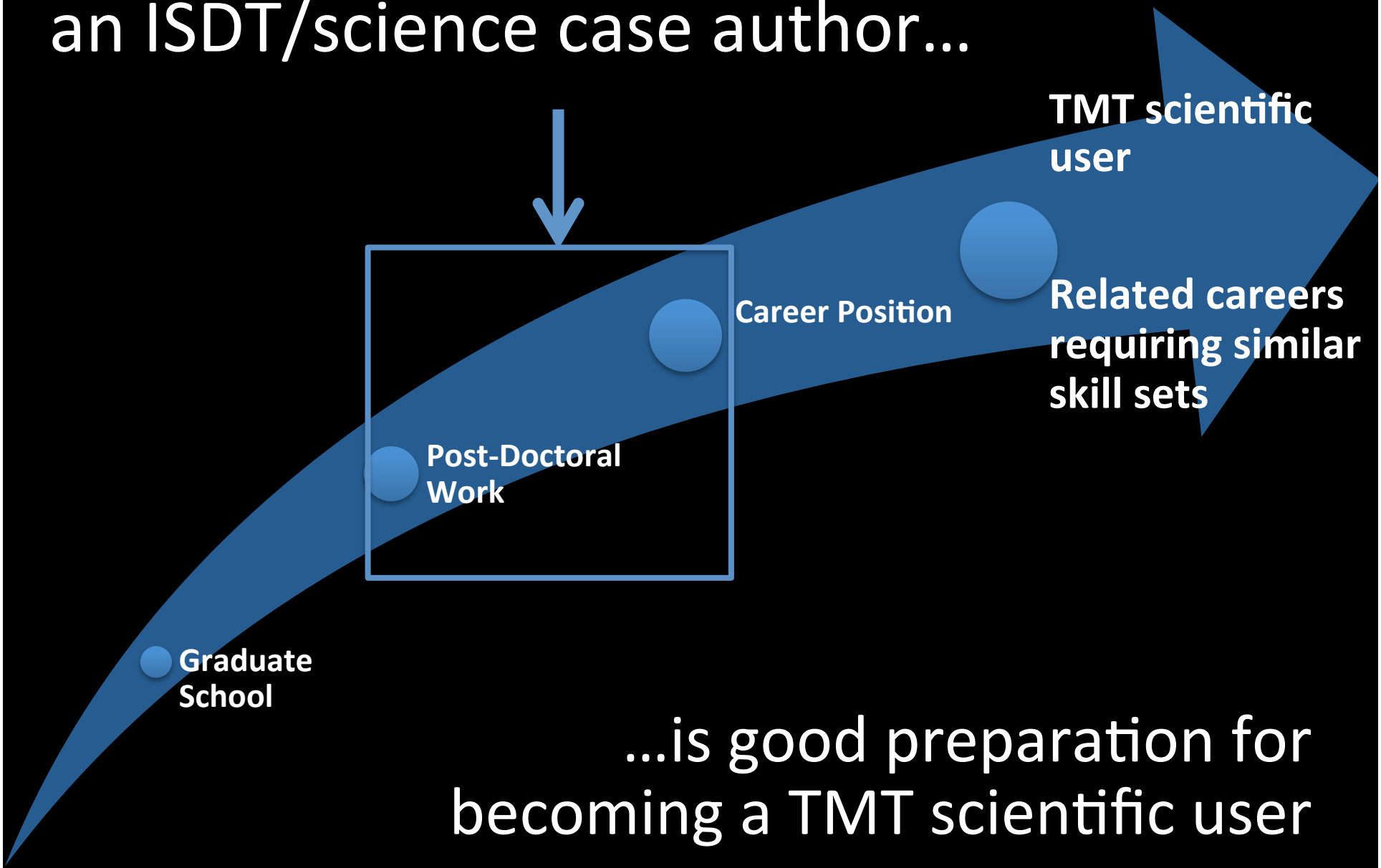
Possible metric: Representation of TIO partners in Detailed Science Case



Workforce development programs use metrics that indicate career progress

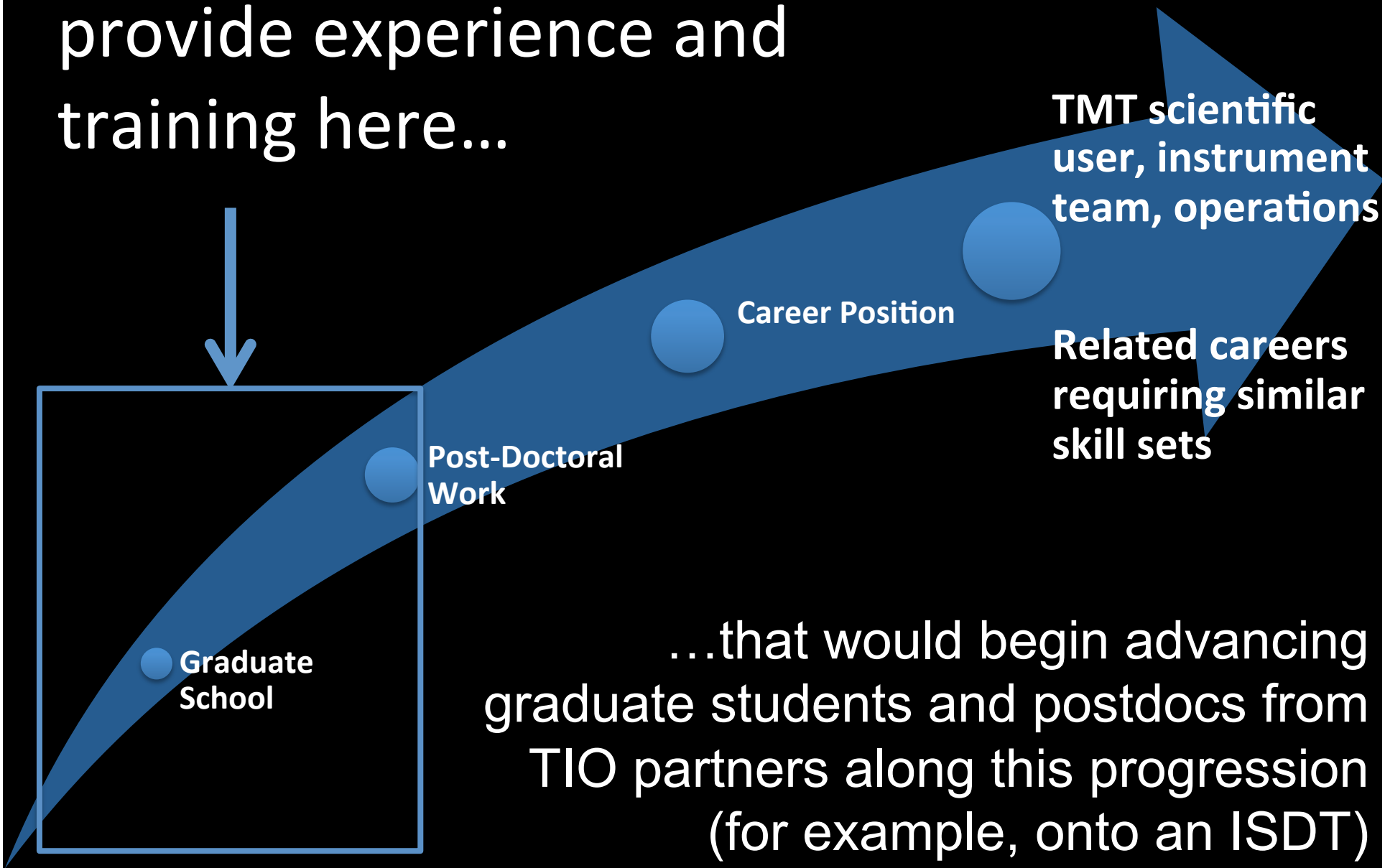


Science example: Participation on an ISDT/science case author…



…is good preparation for becoming a TMT scientific user

TIO training program could provide experience and training here…



…that would begin advancing graduate students and postdocs from TIO partners along this progression (for example, onto an ISDT)

Developing an international training program to serve the workforce needs of TIO

Starting point: students do exchanges or visits across partner sites

Feedback and Ideas from TMT Community has been really positive

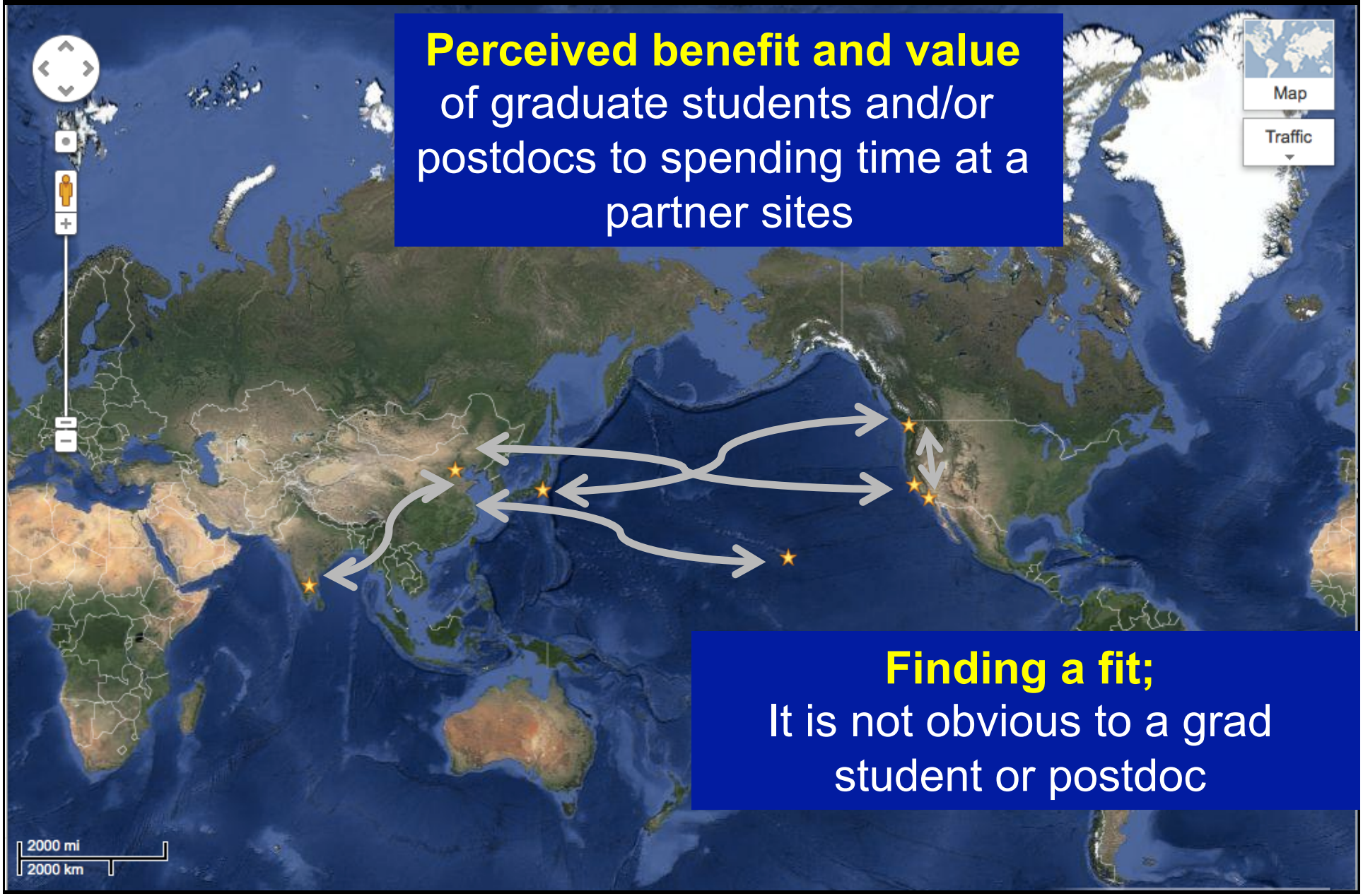
We have visited and met with many TMT partners

Broadly valued by TMT community

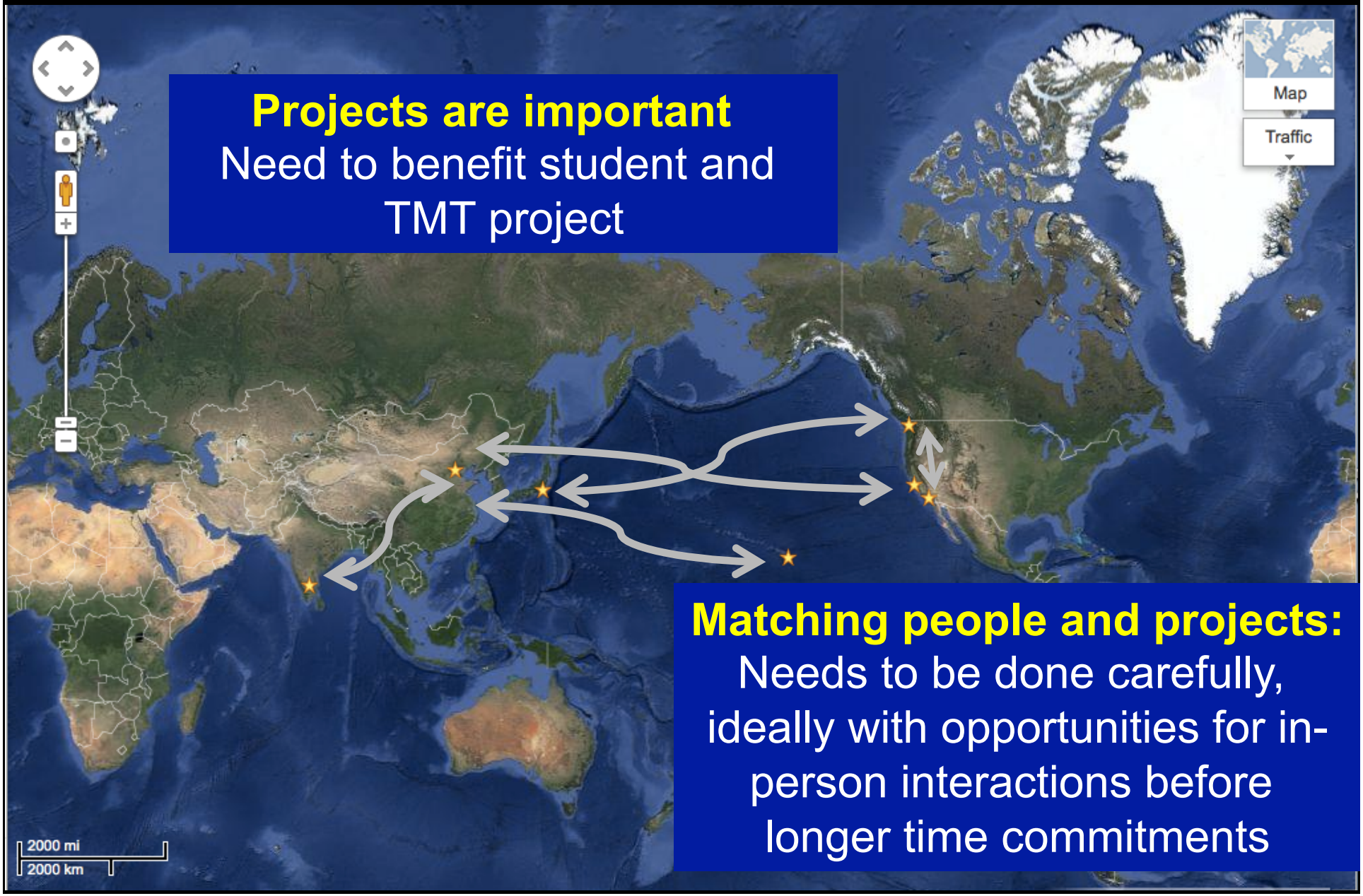
- To enhance collaboration now
- To be positioned for maximizing scientific return at 1st light
- To capitalize on training opportunities in the coming decade (for TMT and related careers)

Will this happen naturally?
Will visits automatically be effective?

Potential challenges identified: recruiting



Potential challenges identified: projects & people



Projects are important
Need to benefit student and TMT project

Matching people and projects:
Needs to be done carefully, ideally with opportunities for in-person interactions before longer time commitments

Potential challenges identified: limitations of just a visit

All "visits" are not the same: Without preparation and some additional support, a visiting participant may not be able to integrate or network at the host institution

Important skills may not come from a visit

Valued Skills and Training Identified

- **Technical skills**: instrumentation, systems eng., adaptive optics, software, data science, etc.

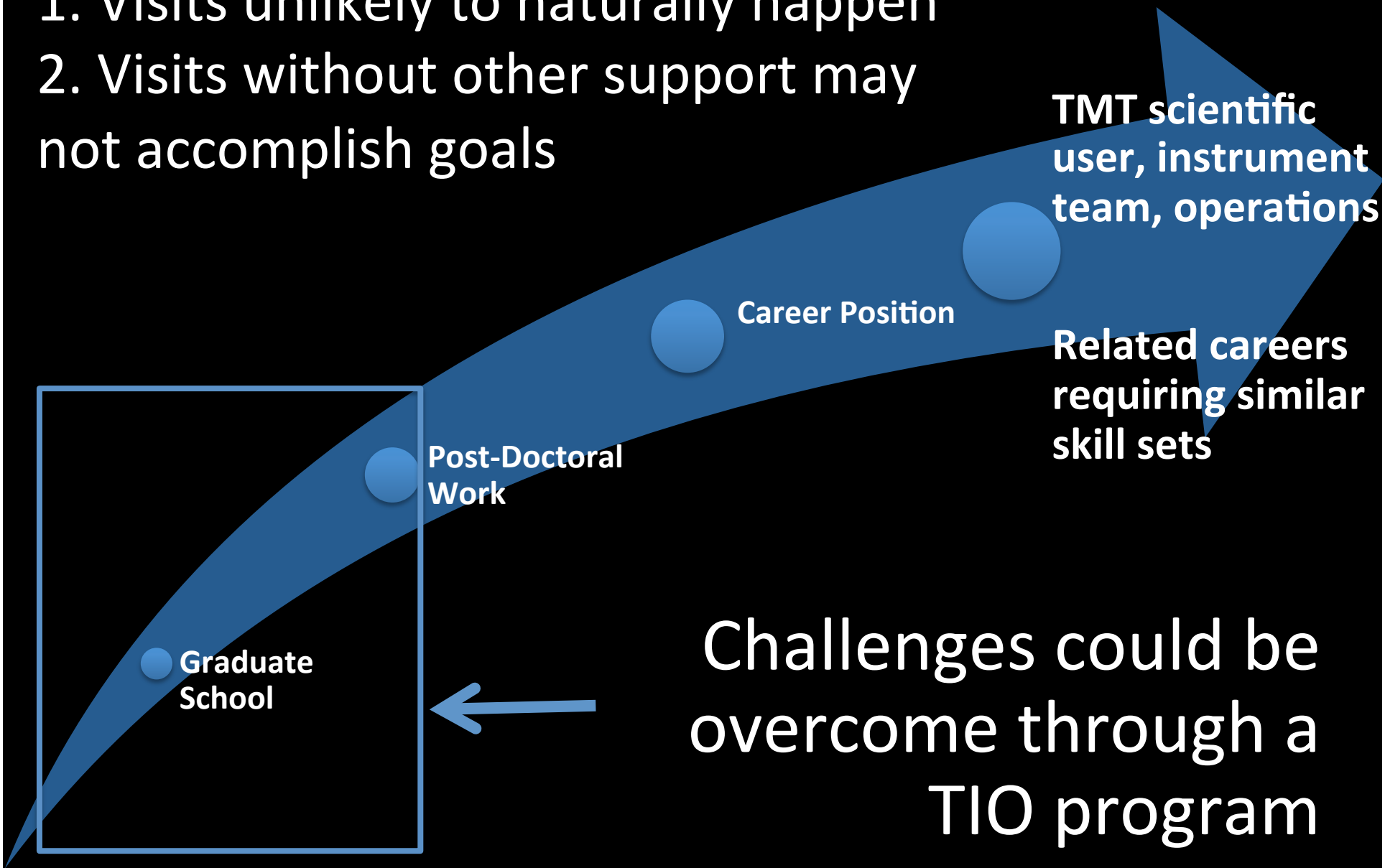
- **Professional skills**
  - Project management
  - Communication
  - Teamwork and leadership

Cultural competency: ability to work with diverse international teams with different cultural norms

Virtual collaboration

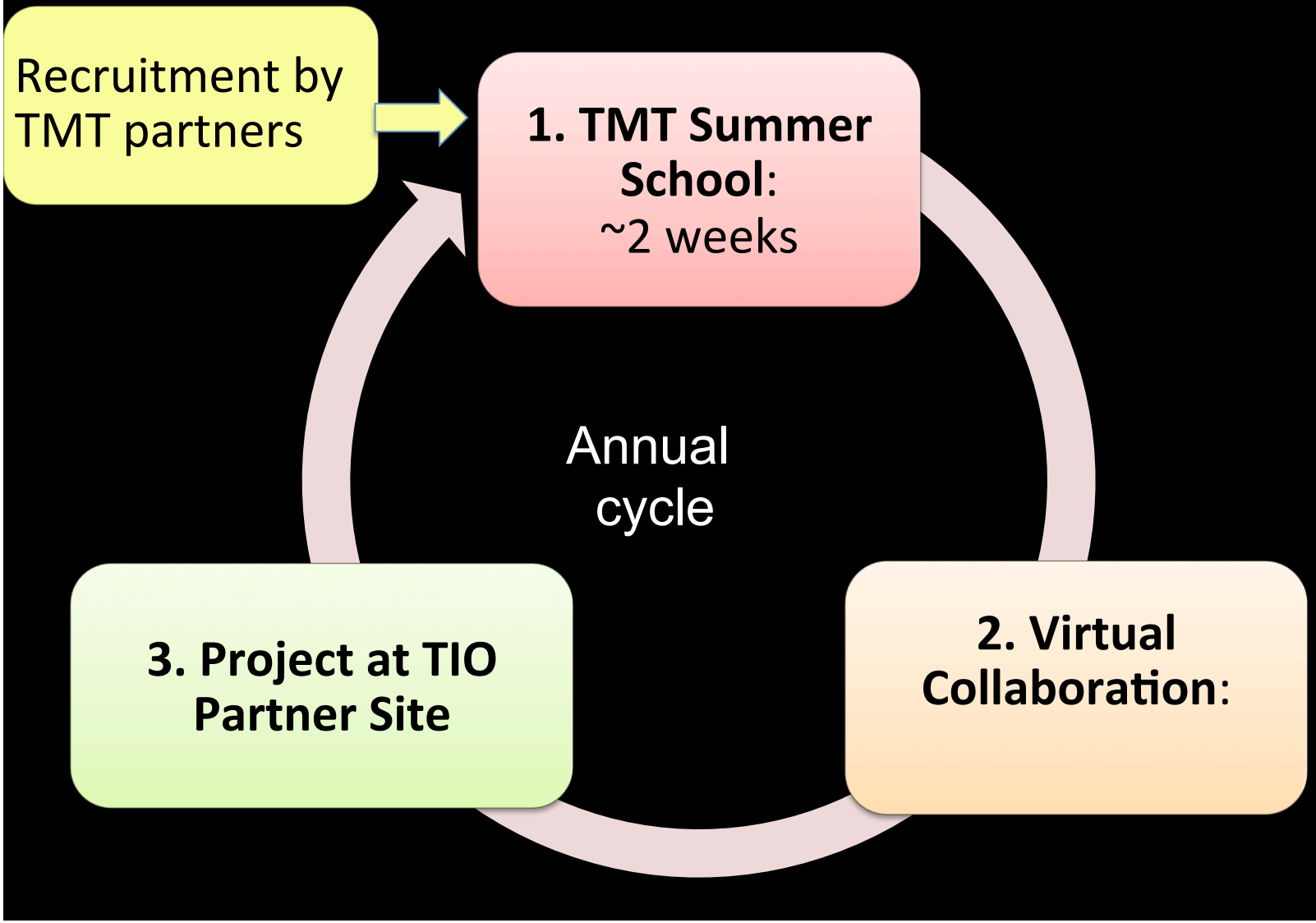
Summary:

1. Visits unlikely to naturally happen
2. Visits without other support may not accomplish goals



Challenges could be overcome through a TIO program

International Training Program
Preliminary Design



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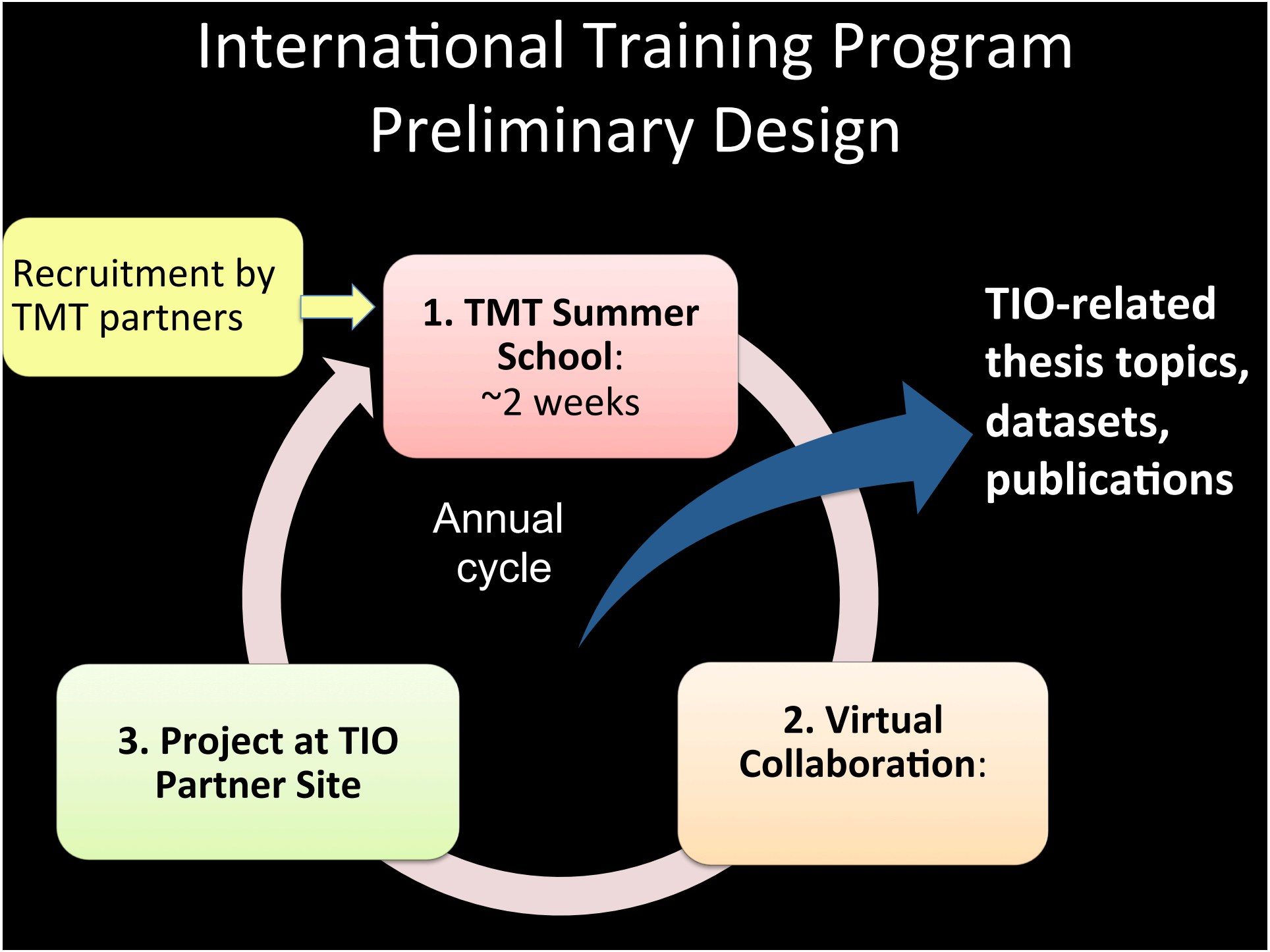
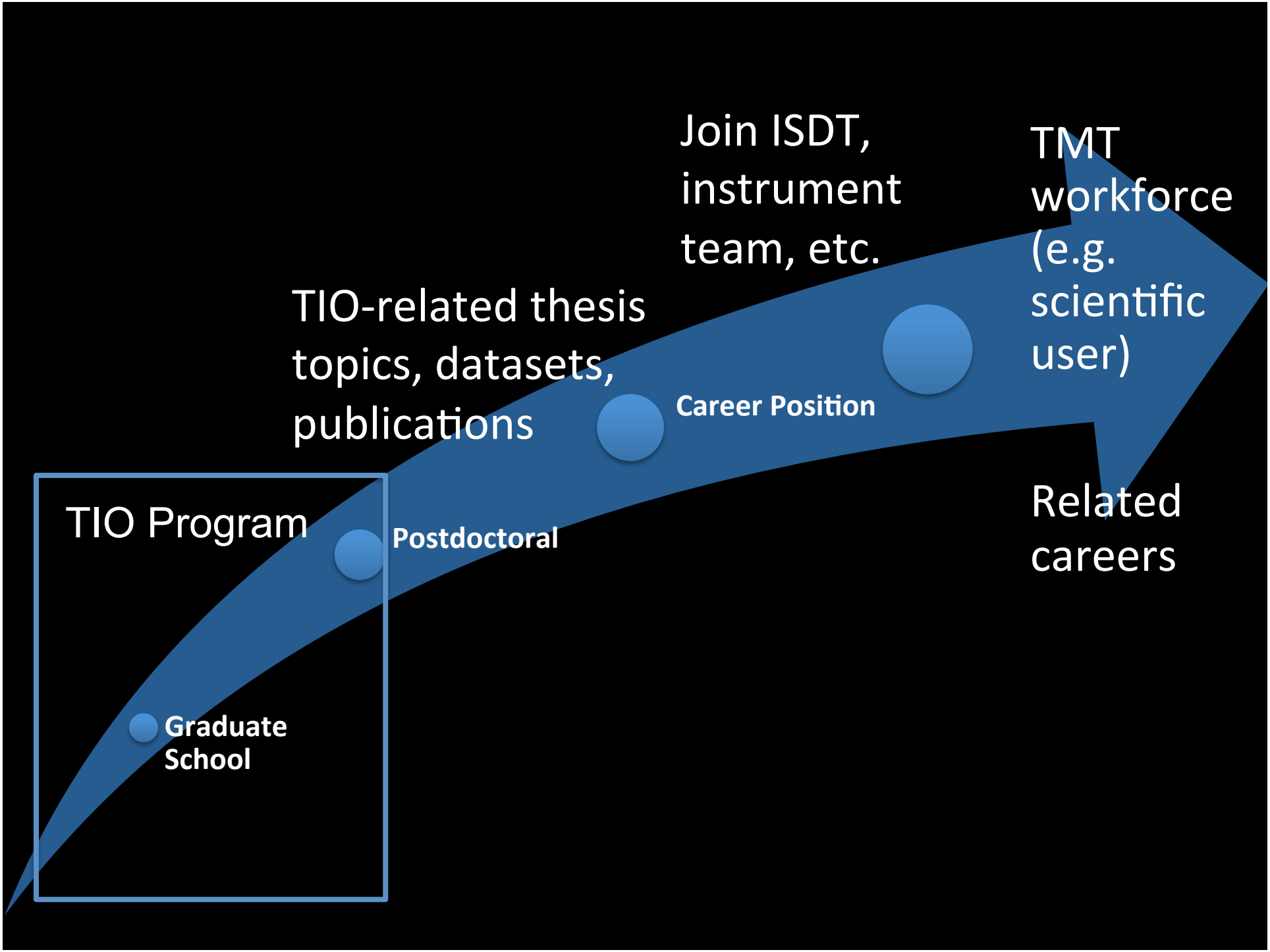
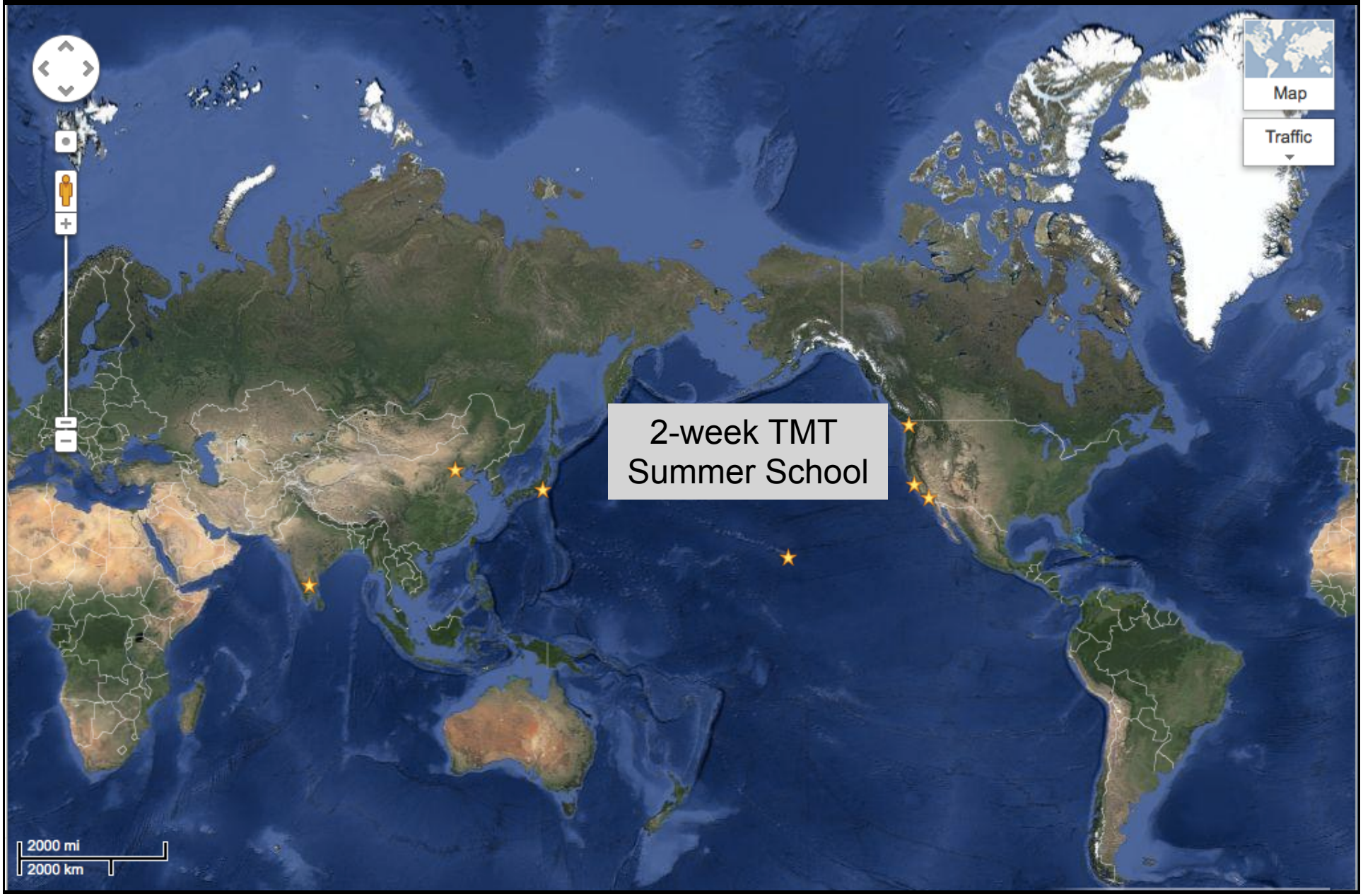
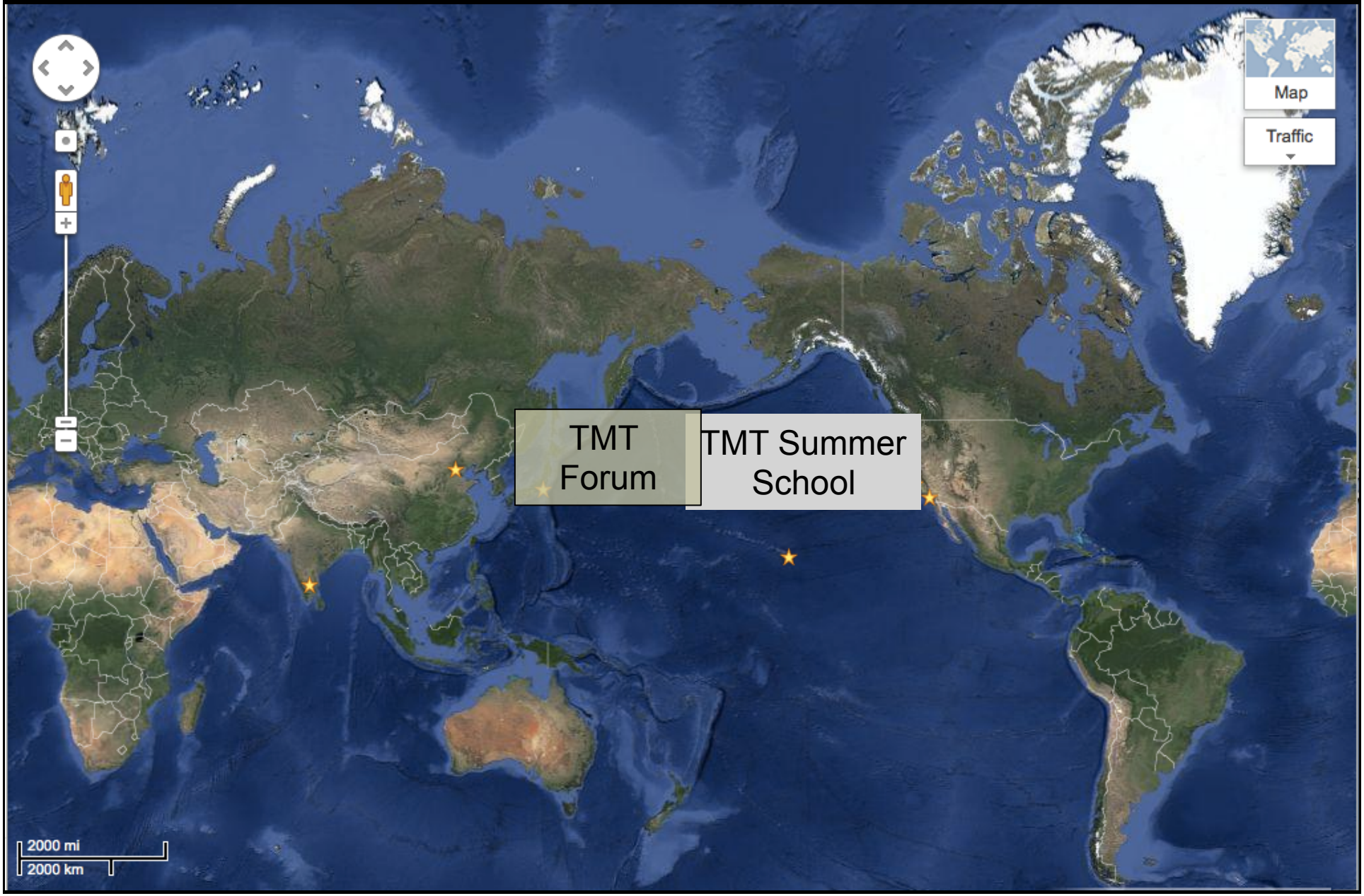



Join ISDT, instrument team, etc.
TMT workforce (e.g. scientific user)
TIO-related thesis topics, datasets, publications
Career Position
TIO Program
Postdoctoral
Related careers
Graduate School

An Emerging Idea:
TMT “summer school” that rotates among partners



Another Idea:
TMT summer school that overlaps ~1 day with TMT Forum



Many other things could be added

- Tap into expertise of community for summer school, defining projects, etc.
- Is there a way for graduate students to be involved in ISDTs?
- Other ways to utilize TIO process and structures to train (e.g. Mini-studies, Forum, etc.)

Please give us your input and perspectives

WEPOC survey:

www.surveymonkey.com/r/TMT_WEPOC_2016

Talk with us at the TMT Forum and/or send an email:

Lhunter@ucsc.edu