Creating a Thriving Workplace:

A conversation about the successes and challenges in building a stellar CI workforce in NSF Major Facilities

Organized by NSF Funded projects:

cicoe-pilot.org
Grant # 1842042

 ci4resilience.org
Grant # 2042054/2042055

June 2021
June 2021

Welcome!

**Ewa Deelman, University of Southern California**

**CI COE Pilot PI, CI4 Resilience Co-PI**

CI CoE Pilot (funded in 2018):
- Understand the CI needs of NSF Major Facilities (MFs)
- Develop a Blueprint and a model for a CI CoE that would provide advice about the CI underpinning the data lifecycle of NSF MFs

CI4Resilience (funded in 2020), Kerk Kee PI:
- Understand how NSF MFs reacted and adapted to the pandemic
- Understand how CI can help to adapt or could help in future crises

Began to understand the uniqueness of MF CI workforce needs
Workshop Organizing Team

- Joel Brock (Cornell, CHESS)
- Laura Christopherson (CI CoE, UNC)
- Rafael da Silva (CI CoE, USC ISI)
- Kerk Kee (CI CoE, TTU)
- Angela Murillo (CI CoE, IU-Purdue)
- Jaroslaw Nabrzyski (CI CoE, ND)
- Chris Romsos (OR, RCRV)
- Mats Rynge (CI CoE, USC ISI)
- Karan Vahi (CI CoE, USC ISI)
- Wendy Whitcup (CI CoE, USC ISI)
Hiring and Retention

- How do you advertise and recruit for open positions?
- What avenues have proven successful for obtaining employees?
- Describe your hiring process. What works well about your current hiring process?
- What barriers do you encounter when filling vacant positions in your organization?
- What type of person are you looking to hire? (Domain scientists, purely software, etc.)
- What skill sets are you looking for in candidates?
- What types of positions do you have difficulty filling? (Indicate professional title/credentials and/or functional roles.)
- Is retaining employees an issue? If so, what are you doing to facilitate retention?
- What support does your institution provide in helping you retain employees?
We have over 50 video conferencing systems scattered over about four different locations on two different continents to allow scientists and engineers to collaborate as if they were in the same room.

- Jerry Brower, Gemini Observatory
IceCube
During winter at the South Pole, a skeleton crew, called winterovers, remain to maintain the station. The sun sets in February and doesn’t rise again until November. It is very difficult to get anything in or out of the South Pole during these months. The average temperature is so low that most aircrafts cannot land.

RCRV
So you really have to be on a boat to make measurements within the ocean interior.
- Steve DiMarco

NEON
The days can be long and the work rigorous at times, including hiking in tough terrain, but the work is interesting, meaningful, and immersed in nature.
They trekked out there to take some measurements and do some troubleshooting. Afterward, they took a break in the snow lying down to look up at the stars and Milky Way.

Long, tiring days at sea are offset by seeing all the wildlife and other natural sights in the open ocean (starry nights with no light pollution, Northern lights, stormy seas, icebergs, etc.), and traveling to different ports and experiencing different parts of the world.

- Jennifer Batryn, OOI

Being an engineer is not to make a lot of money... It is to extend your childhood because you get to play with a lot of cool stuff and they pay you for it.

- Gustavo Arriagada

Gemini Observatory
Agenda

9am PT/12pm ET  Opening Remarks

9:15am PT/12:15pm ET  Keynote: Creating a Trained and Motivated User Base for Large Research Facilities and Their Data

10am PT/1pm ET  Panel 1: Remote/Distributed Team Work

10:45am PT/1:45pm ET  Break

11:15am/2:15pm  Panel 2: Non-Traditional Work Settings

12pm PT/3pm ET  Activity: Creating a work culture that taps into intrinsic motivations

2:30pm PT/4:30pm ET  Closing Remarks
Keynote: Creating a Trained and Motivated User Base for Large Research Facilities and Their Data

Clare E. Reimers
Distinguished Professor, College of Earth Ocean and Atmospheric Sciences, Oregon State University and Project Scientist for the RCRV Project
Creating a Trained and Motivated User Base for Large Research Facilities and Their Data

Lessons from the Academic Research Fleet and UNOLS

Presentation for the CICoE Workforce Development Workshop
6/29/2021
Clare E. Reimers
Oregon State University
SPEAKER ACADEMIC HISTORY

- Undergrad and Grad Education: UVa, OSU
- Postdoc—Assist. Research Faculty: UCSD/SIO
- Tenure-track Assoc., Full, Distinguished Professor: Rutgers
- CIMRS Director: Oregon State University

1972-1982: UVa, OSU, UCSD/SIO
1982-1993: UCSD/SIO, UAF
1993-2000: Rutgers
2000-2021: Oregon State University

First Cruise USGS 1976
First ARF Cruise 1977-R/V Wecoma
First cruise as chief scientist 1987

UNOLS Rep., Council member, FIC, FIC Chair

2011 First Chief Sci Training Program
Large Research Facilities are valuable and often unique assets for advancing science and for workforce development, but these goals can only be fully met when the science user community understands and contributes to:

- what facilities offer
- how they are managed and funded
- how they are accessed and scheduled
- user responsibilities and risks
- capabilities available to promote collaboration, data sharing, and outreach
# ACADEMIC RESEARCH FLEET

## 2021 Fleet Composition

<table>
<thead>
<tr>
<th>Ship/Class</th>
<th>Owner</th>
<th>Operator</th>
<th>Length-Over-All (m [ft])</th>
<th>Delivered (y)</th>
<th>Projected End of Service (y)</th>
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<tr>
<td><strong>Global Class</strong></td>
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<tr>
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<td>22 [72]</td>
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**R/V Sally Ride/ SIO**

Access through funded research projects
Scheduling through UNOLS
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3 RCRVs
NSF Facilities to modernize the ARF
RESEARCH VESSEL WORKFORCE

Integration
Efficiency
Motivation
Success

Scientific Parties
(each with new mission)

Marine Technical Support

Ship's Officers and Crew

Operations Management and Shore Support
WHAT IS UNOLS?

The UNOLS Community

- UNOLS Council (governing body)
- UNOLS Committees
- UNOLS Member Institutions & the Oceanographic Community
- UNOLS Ship & Facility Operators & Tech Staff - RVs, Aircraft, Submersibles
- Supporting Federal Agencies: Navy/ONR, NSF, NOAA, USGS, BOEM
- UNOLS Office
UNOLS Committees

- Ship Scheduling Committee (SSC)
- Marine Seismic Research Oversight Committee (MSROC)
- RV Operators’ Committee (RVOC)
- RV Technical Enhancement Committee (RVTEC)
- Scientific Committee for Oceanographic Aircraft Research (SCOAR)
- Deep Submergence Science Committee (DESSC)
- Fleet Improvement Committee (FIC)
- Arctic Icebreaker Coordinating Committee (AICC)
- Maintaining an Environment of Respect Aboard Ships

Science and engineering workforce driven
Facility workforce driven
In 2010 UNOLS Fleet Improvement Committee set out to address several observations:

- a decline in ship time requests (STR) linked to research proposals
- new researchers lacked knowledge about the STR system and the impacts of requests on proposal success and budget
- many researchers were unfamiliar with what equipment and services ships and other supporting facilities in the ARF had to offer
- many ocean scientists lacked an understanding of the duties of a chief scientist, how to interact with facility operators and marine technicians, and the skills needed to be a cruise leader
- opportunities to acquire samples and test developing equipment could help new investigators to develop future programs
CHIEF SCIENTIST TRAINING PROGRAM
INITIATED IN 2011

Enlisted experienced scientists, marine technicians and operators to train participants in "cradle to grave" phases of expeditionary multi-disciplinary oceanography.

In 1.5-day workshop format discussed initial proposal, facility requests, science and cruise logistics planning, cruise execution, post-cruise reporting, pitfalls.

Through multi-day cruise on a research vessel had participants assemble a synergistic advanced science plan, communicate across the team and with the operator, become familiar with ship’s equipment and the operational environment, lead and maintain the cruise plan, set evolving priorities, follow rules of safety and appropriate conduct, report outcomes.
Initial program involved 4 cruises on 3 different intermediate-sized vessels.

To date: 12 ships have hosted one or more Chief Scientist Training workshops/cruises enlisting 251 participants (mostly early career) selected by an application process.

UNOLS Office has tracked number of STRs submitted by these trainees after their program participation.
Survey sent in June 2021 to the 56 participants from the first 4 workshops/cruises conducted 2011-2013; 26 responded.

1. Since your program participation, have you continued active field work in a discipline of the Ocean Sciences?

- Yes, I am still working in the Ocean Sciences and conduct field work as a sea-going scientist (65%)
- Yes, I am still working in the Ocean Sciences and conduct field work in another capacity (e.g., shipboard technician, engineer) (23%)
- Yes, I am still working in the Ocean Sciences but no longer conduct field work (8%)
- No, I no longer work in the Ocean Sciences (4%)
2. Subsequent Research Cruises (excluding day trips)

- Red: none, 31%
- Green: 1-4, 27%
- Blue: 5 or more, 42%

3. Subsequent Cruises as Chief Scientist
   - R/V Weatherbird II
   - R/V Savannah
   - R/V Pelican
4. Please describe ways your participation in the UNOLS Chief Scientist Training Program has contributed to your career advancement.

“The program gave me insight into the UNOLS organization, the ship time scheduling process, how to prepare to be a good Chief Scientist, and made me much **more confident** about applying for grants that included ship time.”

“The program made me **more confident** in planning my own research at sea and helped me to train students in conducting research at sea during the annual RGNL Namibia field course.”

“The program contributed to my career advancement from post-doc to assistant professor and has provided me with an argument in NSF grants that I am qualified to lead a research cruise.”

“The UNOLS Chief Scientist Training Program cruise in 2011 was my first research cruise where I designed the project on my own. I felt **confident** both during and after the cruise that I could do this. The cruise was short, but it gave me confidence and immense motivation to carry on an academic path.”

“For me, the **greatest value was the scientists I met and relationships I built.”**
5. Please provide a listing of any research publications or thesis that includes results from your cruise participation.

**Journal Publications Reported:**
- Frontiers Mar Sci.
- JGR Atmospheres
- Methods in Oceanography
- Smart Materials and Structures
- Journal of Plankton Research
- Molecular Phylogenetics and Evolution
- ISME Journal
- Limnology and Oceanography
- PLOS One
- Microbiology Resource Announcements
- Environmental Microbiology
- Journal of Great Lakes Research

“subsequent research with collaborators I made on the Chief Sci cruises has led to publications and dissertation studies of graduate students in my group”

“No publications, but I do have a funded NSF proposal now that the cruise gave me the confidence that the idea would work”

“The cruise also provided samples that were used as the basis for my postdoctoral work”

“This program helped me prepare successful proposals to Ohio Sea Grant and develop collaborations with Environment and Climate Change Canada and the Canadian Coast Guard”
Takes time for early career scientists to achieve funding success necessary for cruise leadership

“It took some time before I had the success with grant funding to become a chief scientist, but now I have two cruises this year (one already completed) and next as a UNOLS chief sci and I credit the training program with preparing me for the myriad logistical and organizational steps required to pull off a successful cruise. I’m very thankful for the experience.”

“While funding for cruises continues to be extremely difficult to obtain, taking advantage of this and other ship-of-opportunity cruises has provided many opportunities to gain valuable experience and ultimately yielded pathways for me to get minority and underserved students out to sea to share the experience with them, yielding better prepared graduates from our program.”
CRUIISING WITH CYBERINFRASTRUCTURE

WHAT IS BEING IMPLEMENTED?

- New Software tools for cruise planning, coordination and data sharing
- More sensors and corresponding data streams
- Near-realtime QA/QC
- Near-realtime standard data products
- Interactive data alerts
- Ship-to-shore sharing of data and engagement with onshore specialists.
RCRV Project’s Datapresence via CORIOLIX:
Cruise Observation and Real-time Interface for Open, Live Information eXchange

**Timely Access to Observational Data**
- Instrument observations are relayed to shore and organized for distribution to users

**Standardized Operating Procedures**
- Instrument specific SOP’s
- Community specific SOP vetting
- Applied across the class of vessels (3)

**Quality Checked Data & Documentation**
- Multi-stage QC workflow
- QC methods follow QARTOD
- Instrument maintenance history/logs

**Processed Data Products**
- Engineering to SI unit transformations
- Derivatives (sub-sampled or migrated)
- Synthesis (multi-sensor products)
CORIOLIX provides **real-time access to data and tools** on both **ship and shore**. Shoreside users see the same data, plots and tools as the science party on the vessel. Changes to logs and metadata are automatically copied from ship to shore and vice versa. Shoreside access allows **remote participation** by scientists on shore, data **quality control** by sensor specialists, and **public access** to data and tools for outreach and education.
**MESSAGE-REVISIT**

Large Research Facilities are valuable assets and often unique for advancing science and for workforce development, but these goals can only be fully met when the science user community understands and contributes to:

- what facilities offer
- how they are managed and funded
- how they are accessed and scheduled
- user responsibilities and risks
- capabilities available to promote collaboration, data sharing, and outreach
CONCLUSIONS

- We do not want to leave it to chance and privilege that access to and information about federally-supported Large Facilities is shared widely.

- During operations, programs that invite new users should be part of facility management and workforce development.
Panel 1: Remote/Distributed Team Work

- Alisdair Davey NSO
- John Haverlack - ARF
- David Schultz - IceCube
- Wendy Whitcup - CI CoE
Virtual Solar Observatory

Alisdair Davey
Daniel K. Inoue Solar Telescope
Data Center Scientist

Maybe the sharks are a metaphor?
Virtual Solar Observatory (VSO)

- Homogenous access to heterogeneous data
  - I don’t need to know the details of where and how, just give me the data I WANT!
  - Data providers all round the planet

- Data validation services

- Small Team (6-11 people) since 2002
  - As many as 7 institutions (3 time zones)
  - Scientists and programmers
  - Written in Perl

- Almost daily interactions with each other
  - Status
  - Programming support / Trouble shooting
  - User interaction
  - Supporting projects like SolarSoft and SunPy which can use VSO under the hood
• Programming in Perl
  • Documentation in the code
  • Moving slowly to Python?
• Internet Relay Chat -> ICQ -> Conversations -> Element (matrix)
  • Worked out early that mail was just too cumbersome.
  • Invite data providers to our discussions
• Early adoption of wikis / ticketing
• Code versioning is important
  • CVS (some code now in git)
  • Custom scripts to parse CVS to see what’s changed daily
• Hard to move on from what you know (are comfortable with!)
  • git learning curve makes us pause!
Challenges

- Small teams can be very collaborative especially when they are all highly invested in what you are doing, but it still must be clear who is in charge even / especially in projects that have been going for many years with the same people.
  - Enforce management structure where necessary
- Working with people you have at best minimal influence (remote data providers) over is challenging! Changes to machines / web servers / databases / personnel will happen. Often only find out about changes when things break!
  - Shot ourselves in the foot by not insisting on minimal data standards in the beginning
  - Didn’t build in testing from the beginning
- Changing face of IT infrastructure

Successes

- Project is still going after nearly 20 years!
  - VSO is a focused project to serve the solar physics community. Having a strong focus aids greatly when working with a remote team. Near daily interaction helps this
- We encourage training and updating skills. If you learned something new, write a wiki page about it and give a short presentation or demonstration
  - Covering for each other – spreading knowledge wealth – supporting team ethos
U.S. Academic Research Fleet (ARF)
University of Alaska Fairbanks (UAF)
R/V Sikuliaq

John Haverlack  (jehaverlack@alaska.edu)
- IT Manager UAF College of Fisheries and Ocean Sciences (CFOS)
- B.S. Physics ‘94 Virginia Tech
- Linux Systems Administrator / Programmer / IT Manager since 1991
  - Transmeta Corporation
  - Sourceforge Inc.
  - Alaska Satellite Facility (UAF)
  - College of Fisheries and Ocean Sciences (UAF)
IceCube Neutrino Observatory

David Schultz
- Production Software Manager
IceCube Neutrino Observatory
University of Wisconsin–Madison

Computing grid. Dedicated sites in blue, opportunistic/cloud in green.
What is IceCube?

Construction: 2005-2010, future upgrades
Operation: 2010-?
IceCube has a long history of workshops to train people.

Pre-pandemic, these were typically once or twice a year in-person.

In the last year, we’ve hosted multiple virtual workshops (with full recordings) on various topics:

- Traditional intro to IceCube/software
- Software languages in depth: C++, Rust

With the large number of grad students, this helps establish a base software proficiency and gives them experience if they go into industry.
One Challenge - Collaborative Work

Because IceCube is a global collaboration, we have many people working in different time zones throughout the world

- Most supervisor / lead positions are in US
- Most developers are in Europe or US, but some are in Japan, New Zealand, and Australia

Additional problem: most work is “in-kind” contributions from grad students, who report to their professor instead of a central manager

We’ve tried various things, but haven’t found a good solution yet
Wendy Whitcup - CI CoE Pilot

● Wendy Whitcup
  ○ UCSB, Anthropology, tech, SCRUM, PMP
● CI CoE Pilot
● Challenge
  ○ Acting as a new Project Manager
    ■ Specific to MFs
● Success
  ○ Building relationship with MF personnel
Break

- We will resume 2:15 EST / 11:15 PST
Panel 2: Non-Traditional Work Settings

- Ralf Auer - IceCube
- Joel Brock - CHESS
- Laura Greene - MagLab NHMFL
- Chris Romsos - RCRV
Creating a Thriving Workplace
Cyberinfrastructure Center of Excellence

Ralf Auer, IceCube / WIPAC
University of Wisconsin-Madison

29 June 2021
Self Introduction

- Research Cyberinfrastructure Manager for UW-Madison’s IceCube project
  - $300M Neutrino observatory, located at NSF’s Amundsen-Scott research station, South Pole, Antarctica
  - https://icecube.wisc.edu
- joined the IceCube project in 2009
- physics degrees, then moved on into IT and project management
- key responsibilities:
  - maintain IceCube data center at South Pole (~150 servers, ~70kW, ~1PB/yr)
  - hire, train, and supervise on-site detector operators
  - interface between detector operations, researchers, and IT
Atypical work environment

- deploy to South Pole for ~2 months every year for upgrade and maintenance task, as well as on-site operator training
- very limited accessibility to site (Nov – Feb only), hard deadlines for season prep
- limited cargo capacity, delivery uncertainties, logistical challenge
- very limited communication channels between North / South – low bandwidth satellite internet for a few hours/day (modem speed!)
- medical and psychological clearance required every year to deploy
- everything running on unreliable diesel generators, power situation very unstable
- no vendor access to site, limited tech support channels
- no mail ordering or express shipping of parts → wait for a year!
Atypical work environment

- South Pole located @ 10,000ft altitude, 0% humidity → outside of most equipment specs, ESD is serious problem
- satellite communication window moves up ~4min/day, shifts work hours constantly
- 2 FTE 24/7/365 staff on-site for IceCube project
- on-site operators can’t leave or be replaced → very thorough, multi-stage hiring process every year, includes medical and psychological screenings
- site not accessible outside of summer season → operator training in Madison → scale replica of data center
- 24/7 sunlight for 6 months during summer, 24/7 darkness for 6 months during winter
Located 5 stories under the athletic playing fields, the Cornell High Energy Synchrotron Source is a high-intensity X-ray source which provides 1000 users/year state-of-the-art facilities for research in Physics, Chemistry, Biology, and Environmental and Materials Sciences.

CHESS is supported by NSF (CHEXS), AFRL (MSN-C), NIH (MacCHESS), and NYSTAR.
**X-rays and X-ray Sources**

**X-rays** are short wavelength or energetic light.

**X-rays** are uniquely suited to penetrate opaque material and non-destructively probe the structure of matter on length scales ranging from shipping containers to medical x-rays to the atomic-scale.

**Synchrotrons** are exceptionally bright sources of x-rays. If a medical x-ray unit is a candle, a synchrotron corresponds to the lights at a football stadium.
INTRODUCTION TO CHESS

LINAC, booster synchrotron, and storage ring (CESR) create the relativistic (6 GeV, 100mA) positron beam. Undulator magnets “shake” the positron beam, creating a highly collimated beam of intense EM radiation (X-rays) which is delivered to experimental stations.

CHESS users come from diverse disciplines, studying a wide variety of samples in diverse environments, using multiple techniques and analyses.

Steadily increasing data rates

Data collected per run

3D Virtual Tours: https://www.chess.cornell.edu/3d-virtual-tours
Overview to the NHMFL
Laura H Greene, Chief Scientist
lhgreene@magnet.fsu.edu
National High Magnetic Field Laboratory

Florida State University

High B/T Facility
17T, 6 weeks at 1mK

Los Alamos National Laboratory

University of Florida

Advanced MRI and Spectroscopy Facility

101T Pulse Magnet
10mm bore

1.4 GW Generator

45T Hybrid DC Magnet

11.4T MRI Magnet
400mm warm bore

900MHz, 105mm bore
21T NMR/MRI Magnet

University of Florida

High B/T Facility
17T, 6 weeks at 1mK
In 2019, the MagLab User Program helped to train ~300 postdocs and ~7500 grad and undergrad students and published ~440 refereed papers, including…

In 2019, the MagLab hosted experiments by more than 2,096 users from 298 institutions across the US (76% Univ; 18% Labs; 6% Ind) …and a total of 298 institutions from throughout the world.

Every year, more than 20% of the experiments’ Principal Investigators are first-time-ever PI’s at the MagLab.
MagLab Outreach in 2019...

10,800+ visitors – the largest crowd in MagLab history – came from across the southeast to sample the 100 hands-on demonstrations on the science smorgasbord of annual Open House event.

141 middle school students in long-term mentorship or camp programs, 89% of whom were from underrepresented minority groups.

77 scientists & staff reported conducting outreach to the community. Together, these scientists reached 7,100+ people.

1.4 MILLION+ website pageviews

4.5 MILLION+ minutes of MagLab video content watched on YouTube.
The MagLab Mission: 1990-present
• Operate a world-leading high-magnetic-field user program
• Carry out in-house research in support of the user program
• Maintain facilities and develop new magnets/instrumentation
• Conduct education and outreach activities

~ 94 MagLab Research Faculty with charge:
• 1/3 Personal Research
• 1/3 Technique Development
• 1/3 User Support.

Credit given for education and outreach
Almost no one splits their time exactly this way; putting their time mostly into one of these categories; but all do at least some user support. Our other professionals, such as teaching faculty, also work in all of these three areas.
Chris Romsos
Datapresence Systems Engineer
Oregon State University, College of Earth, Ocean, and Atmospheric Sciences
Regional Class Research Vessel Project (RCRV)
My Responsibilities / Facility Role:

Design, specification, procurement, and installation of shipboard and shoreside CI systems for the RCRVs.

- Shipboard LAN & network services
- Computing and storage infrastructure
- Underway (resident) sensor systems
- Datapresence & Telepresence

https://webcam.oregonstate.edu/rcrv4
Lifestyle

Time: Vessels are at sea roughly 180 days per year. So far, building the vessel hasn’t required too much time at sea
Space: 20+ people aboard the ship, ~2mbps to share for Operational, Scientific, and Quality of Life.....

Technical

Community of Practice: Supported by a truly remarkable technical peer community known as RVTEC
Pace: High rates of configuration change (personnel, scientific & operational equipment)
Operational: Construction project has been a big change from previous scientific research support
Pain Points: Keeping the suite of CI and services pointed toward the intersection of requirements, regulations, and potential
Activity: Creating a work culture that taps into intrinsic motivations

Andrew Brown
Andrew Brown joined Notre Dame Research in 2018 as the division's first Operational Effectiveness, Assistant Program Director. He is responsible for improving onboarding, developing professional pathways, and enhancing overall work culture within NDR. Over the past year and a half, one project Andrew has been working on is this intrinsic motivation leadership series for all 50+ supervisors of Notre Dame research. You will see the highlights of that series today. Before joining NDR, Andrew worked for four years within the Notre Dame Office of Human Resources as a Recruiting Consultant. Andrew completed his B.A. in Psychology from Wabash College and his M.Ed. in Training and Development from North Carolina State University.
WELCOME

While we wait for others, please complete the poll question at http://pollev.com/ndresearch
**Our results**

- Clear goals: 1st
- Recognition for good work (either public or private): 2nd
- Support for making progress: 3rd
- Interpersonal support: 4th
- Incentives: 5th

**Amabile’s Results**

- #1 Recognition
- #2 Clear Goals
- #3 Incentives
- #4 Interpersonal Support
- #5 Support for Making Progress
Today we will cover

• What is Intrinsic Motivation

• Buildings Blocks of Intrinsic Motivation
  • Autonomy
  • Mastery
  • Purpose
  • Progress

• How you can use the power of intrinsic motivation for yourself and/or your team.
What is Intrinsic Motivation?
Motivation

Extrinsic Motivation

Intrinsic Motivation

Intrinsic Motivation
Engage in a behavior because it is personally rewarding, not for an external reward
Autonomy

The urge to direct our own lives.
Autonomy Pulse

• On a 1-10 scale with 10 being total autonomy and 1 being extremely micromanaged. What is your **desired level** of autonomy for your work?

• On the same scale, what is the **current level** of autonomy with your work?

• **Desired Level – Current Level** = ?
Autonomy in practice

Autonomy is not a one-size fits all approach

- Delegate authority where possible
- Trust your workers and accept that the outcome may be different from how you would do it
- Provide safety (no punishment for honest mistakes)
- Provide a clear purpose and goals
- Ensure that employees have an understanding of their roles and how their work impacts others

**If your score was not 0 – ask yourself what specific changes would get you there?**
Mastery

Getting Better and Better at something that matters.
What is Mastery?
Getting better and better at something that matters. Cites Mihaly Csikszentmihalyi and his life work studying the highest, most satisfying experiences in people's lives what he called FLOW.

In FLOW, the goals are clear, the feedback is immediate and most importantly the relationship between what a person had to do and what they could do was perfect. It was a notch or two beyond current abilities.

Let's Dive in to FLOW a bit more.
Find your FLOW

• Think about a recent activity or project (could be anywhere) where you felt the following.
  • Intense and focused concentration on the present moment
  • A sense of personal control or agency over the situation or activity
  • A distortion of temporal experience – time flew by
  • Experience of the activity itself as intrinsically rewarding
Put a dot as to where the example you described falls on the Challenge and Perceived Skill level Graph Below.
Results

[Graph showing scatter plot with points indicating challenge level against skill level.]

[Graph showing quadrant划分 with labels Anxiety, Flow, Control, Worry, Apathy, Boredom, Relaxation, and Arousal against challenge level and skill level.]
Mastery in practice

• Managers:
  • Are your employees operating in flow? How do you know?
  • If they are not, what specifically can you do to get them there?

• Employees:
  • Do you have flow moments at work?
  • If not, what needs to change (do you need to develop skills or increase challenge?)
Purpose

The yearning to do what we do in the service of something larger than ourselves
Work Purpose Word Cloud

• In one sentence, why do you do what you do?

•
Science make others

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new work.
A.M. Grant and D.A. Hofmann, *Outsourcing Inspiration: The Performance Effects of Ideological Messages from Leaders and Beneficiaries*. 2011
Fundraising Call Center

**Group 1**
Met F2F with “Will” a scholarship recipient

+142% Effort
+171% Productivity

**Group 2**
Was read a letter from “Will” with no direct contact

No Change in effort or productivity

**Group 3**
Control Group

No Change in effort or productivity
Research

• A.M. Grant and D.A. Hofmann, *Outsourcing Inspiration: The Performance Effects of Ideological Messages from Leaders and Beneficiaries*. 2011

• “Meaningful work is a cornerstone of motivation… But all too often, employees do work that makes a difference, but never have the chance to see or meet the people affected by their work.”
  • Outsource Inspiration
  • Leaders are linking pins
  • The power of 1 person
Purpose In practice

• You should know why you do what you do.
• Leaders should be authentic. Know your own work purpose and work with / coach your staff to help discover and experience theirs.
• Leaders need to be linking pins by connecting employees to the people who find their work meaningful.
Progress

The #1 motivator for inner work life is making progress in meaningful work.
Progress is....Everywhere

In your daily work...
Progress is.... Everywhere

Fitness
Progress is.... Everywhere
Progression in Gaming
Why is progress everywhere?

Because it is a powerful motivator!

…continue that survey, keep working out, keep going towards the checkout and keep playing.
But what about Progress at work?
The Research

Purpose: Understand the role of inner work life in organizations: what influences it and how it influences performance.

Methods: Asked members of project teams to respond individually to an end-of-day email daily diary during their projects (4 months on average).

The Daily Diaries: Inquired about emotions, moods, motivation levels and perception of the work that day. Also about the work they did and what stood out to them that day.

Specifics: 26 project teams from 7 companies. 238 total people surveyed and yielded ~12,000 unique entries of qualitative and quantitative data for analysis.
What happens on Good days?
What Happens on Bad Days?

<table>
<thead>
<tr>
<th>% of Diaries</th>
<th>Progress</th>
<th>Setbacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>25%</td>
<td>67%</td>
</tr>
</tbody>
</table>
The Progress Principle

#1 driver of inner work life is making progress in meaningful work.
Rank the impact on employee motivation and emotions of five workplace factors commonly considered significant

Our results

Amabile’s Results

#1 Recognition
#2 Clear Goals
#3 Incentives
#4 Interpersonal Support
#5 Support for Making Progress
Catalysts & Nourishments

• Catalysts are events supporting the WORK.
  • Setting clear goals
  • Allowing Autonomy
  • Providing Resources
  • Providing sufficient time
  • Helping with the work
  • Learning from the problems and successes
  • Allowing ideas to flow
Catalysts & Nourishments

- Nourishments are actions supporting the PERSON.
  - Respect
  - Encouragement
  - Emotional Support
  - Affiliation
Inhibitors & Toxins

_Inhibitors_ are the opposite of catalysts and _Toxins_ are the opposites of nourishers. These negative actions include failing to support the project or the person, as well as actively hindering the project or disrespecting the person in some way.
Put Progress into practice...

- Be aware of and support a work climate where progress is encouraged for all.
  - Point out progress when you see it
  - Don’t devalue progress that has been made
- Be a **catalyst** and **nourisher** where possible.
- Minimize **inhibitors** and **toxins** where possible.
- **Be linking pins** by connecting employees to the people who find their work meaningful.
Final Poll

http://pollev.com/ndresearch
Closing Thoughts
Thank you!
abrown20@nd.edu
CLOSING REMARKS 06
Closing Remarks

● Kerk Kee - PI for CI4Resilience
  ○ https://ci4resilience.org/
● Thank you to all of our speakers, panelists, and participants!
● Expected outcomes of the workshop
  ○ Workshop Report
  ○ More conversations
● Survey Link
● Website for workshop where we will be posting outcomes: https://cicoe-pilot.org/creating-a-thriving-workplace
● We will send out communication when the above is available
THANKS!
Credits/References for Opening Remarks (slides 6-8)

Slide 6:
- Photos taken from USAP's (US Antarctic Program) image gallery: https://photolibrary.usap.gov
- Quote is from Jerry Brower at Gemini: https://www.gemini.edu/careers?utm_medium=print&utm_source=brochure&utm_campaign=Careers2016#Gustavo_Arriagada

Slide 7:
- RCRV snapshot and quote taken from: https://youtu.be/lNtosWlboSc
- IceCube Life at the Pole blog:
  - Quote from: https://icecube.wisc.edu/pole/daily-life/
  - Photo from: https://icecube.wisc.edu/news/life-at-the-pole/2021/05/week-19-at-the-pole/
- Gemini Observatory photo taken from: http://www.gemini.edu/gallery/media/sunset-over-gemini-south
  - Quote from https://www.neonscience.org/get-involved/work-opportunities/seasonal-fieldwork

Slide 8:
- MagLab poster taken from: https://nationalmaglab.org/images/staff/searchable_docs/maglab_staff_map.pdf
- IceCube Life at the Pole blog quote and photo taken from: https://icecube.wisc.edu/news/life-at-the-pole/2021/05/week-19-at-the-pole/
- Gemini
  - Quote from Gustavo Arriagada video on https://www.gemini.edu/yourfuture
  - Photo from https://www.gemini.edu/gallery/media/altair-optical-bench-alignment
- OOI (Oceans Observatory Initiative)
  - Jennifer Batryn quote taken from: https://oceanobservatories.org/2021/03/women-who-make-ooi-happen/