

Forming the Right Research Team

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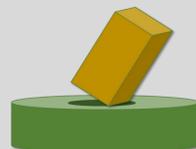
BUILDING the RIGHT RESEARCH TEAM

What motivates the need for a team?

Those instigating collaborations generally start by asking what kinds of instrumentation and resources their projects need, and who has the power to decide whether they go forward.

(Structures of Scientific Collaboration, Wesley Shrum, Joel Genuth, Ivan Chompalov, W. Bernard Carlson, Wiebe E. Bijker, MIT Press, 2007)

Forcing a square peg into a round hole can be painful!



The purpose of this project was to delve into challenges of building an effective research team, primarily to research and discuss frequent associated gaps regarding priorities in research objectives, research approaches, required expertise, and networking to most effectively accomplish research objectives. Since the identification of gaps was chosen as the focus, the outcome is largely a collection of questions and considerations relevant to the formation of a team. The majority of content is from a breakout session of an international workshop at Purdue University organized by the Resilient ExtraTerrestrial Habitats group (RETH) to discuss the challenges associated with establishing and operating permanent habitats outside Earth, and explore potential solutions to address the challenges. The attendees included researchers from academia, governmental agencies, and industry. The information on this poster is based on those conversations. However, these ideas can be applied to many research scenarios.

TEAM COMPOSITION AND AGENCY COOPERATION

Collaboration relationships often are primarily driven by four factors (Shrum et al. 2007):

- Interpersonal – either pre-existing or brokered (pre-existing, knew each other, undertaking project too large or complex for small group; brokered by other parties)
- Funding context – availability of state or private patrons and fiscal and political climate; resource uncertainty, gaining access (see as challenge to overcome vs. limit on ambitions)
- Sectoral context – academia, industry, governmental – with traditionally different goals and cultures
- Participating organization – relationships among established, permanent organizations – university departments, national labs, government research labs, industry research labs

Sectoral Context

From each point of view – academic, governmental agencies, industry, other - what is the definition of a successful team?

More collaboration - how do we best blend those and have most success?

In government and academic cooperation:

- working with a university usually leads to investigating a wider variety of solutions that tend to be more creative due to the larger manpower amount with more flexible time resources, inclusion of students
- Provides many potential options to gain an interdisciplinary outlook related to the problem statement
- It is important to be able to build a long-term schedule that takes budgeting as a primary part of their schedule design

In industry, government, and academic cooperation:

- communication and the partnership between government, industry and academia need to be strengthened.
- while the government may focus on determining what topics of research are important to the project at hand, ultimately it should also focus on facilitating the contact between industry and academia.
- industry may have an upper hand in being able to provide resources, and equipment
- industry may need to be more flexible when comes to sharing intellectual properties



IDENTIFIED POTENTIAL GAPS IN KNOWLEDGE - REQUIREMENTS

Topics and associated influences

Intended outcomes - customer needs, expected results, purpose, always address unclear details

How to discover and meet constraints - conditions, infrastructure, necessary knowledge, budget and time schedule, cost

Facilities that enable collaboration and enhance partnerships, provide flexibility

Necessary data, time frame, environment, labs and technology, contacts

Innovation - academic partnerships and involving graduate students

Training of students

Intellectual property, how to publish, ensure mutual benefits

CONTEXT IS CRITICAL - CONDITIONS

Primary questions that need to be answered when attempting to build a team:

What is the research goal?

What is the form of the expected research result?

Who are the customers for the product (research, in this context) made by this team? What are the technological and economic constraints in place?

What is the infrastructure already in place with regards to the project?

What are the requirements for each team member?

After Requirements and Conditions: **Select Team Leader**

Communication

Team first

Timeline

Encourage diversity of people, ideas, backgrounds and experience

Other skills such as management, funding, equipment, relationships, etc.



NETWORKING AND A BROAD KNOWLEDGE BASE

At the end, networking was discussed as a means to connect researchers and lead to stronger and more integrated teams. Branching out to find resources and expertise outside of a researcher's focus area was a topic, including reaching outside of the typical publication venues.

Some key questions to consider in this area include:

How do individuals build reputations and careers to enable collaboration?

How do permanent organizations help build those reputations?

How do individuals learn new skills, rekindle or redirect a career?

Thoughts on international collaborations

How much does mentoring help team building?

How to build trust - pick trust-worthy collaborators?

How do you start?

SUMMATION FOR FORMING THE RIGHT RESEARCH TEAM

What are the requirements of the research?

What are the conditions?

Identification of:

- Knowledge needed
- Skills and equipment needed
- Who has the knowledge and skills? Equipment? Network?
- Leadership

How can success be ensured?

Thank you to those who helped make this possible, including all the good examples from current and past research groups at NASA and industry, my great colleagues in PESLA, the Purdue RETH Team, and the Purdue College of Engineering, and INSG affiliates.

