Composition of Scientific Teams and Publication Productivity
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Purpose
This study examines scientific teams at the National High Magnetic Field Laboratory (NHMFL) to determine how the diversity of science teams effects overall team productivity as measured by peer reviewed journal publication.

Why scientific teams?
• The production of scientific knowledge has evolved from a process of inquiry largely based on the activities of individual scientists to one grounded in the collaborative efforts of research teams.
• Recent studies show that impacts of scientific teams are higher than that of individual scientist. Multi-authored publications are now cited more frequently than single-authored publications.

Why the NHMFL?
• The NHMFL is the world’s largest and most highly powered magnet laboratory.
• The Lab hosts over 900 scientists per year.
• The Lab is multi-disciplinary, with scientists working on research from a variety of areas in physics, biology, bioengineering, chemistry, geochemistry, biochemistry, and materials science.

Methodology

Data: 1,415 experiments conducted at the NHMFL between 2005 and 2008; 1,514 distinct names

Sample: 89 teams of size 3

Methods: network analysis, correlation analysis, and quantile regression analysis

Findings
The results from quantile regression supported H2 but did not support H1, H3, H4, and H5 (see table below).

The level of team cohesion as measured by the number of experiments in which the same team members participated was positively related to productivity.

Disciplinary diversity was positively related to productivity. However, diversity in regards to seniority was negatively related to productivity.

Teams with mixed institutional associations were more central to the overall network compared to teams with homogeneous affiliations.

Below: Quantile regression results (* p<0.05, ** p<0.005)

Research Hypotheses

H1: Increased diversity in institutional affiliations is associated with a decrease in team research productivity.

H2: Increased diversity in the scientific disciplines represented in the team is associated with increased productivity.

H3: Increase in gender diversity has no or an insignificant effect on team productivity in scientific teams.

H4: Diversity in team seniority is positively related with team research productivity.

H5: Teams in more central network positions are likely to be more productive.

Limitations
Data was obtained from internal documents such as annual reports and publication logs. Collecting additional types of data through observations, interviews or surveys of team members and key institutional stakeholders may provide additional information regarding the factors that impact the productivity of scientific teams.

Future research may find it helpful to control for team longevity since the longevity of teams may influence the development of work norms and relationships, which in turn may impact their productivity levels.

Conclusions
This study provides evidence to governmental funding agencies, administrators in research laboratories, and the broader science and research policy community regarding the benefits of interdisciplinarity, moderate levels of seniority, and network centrality for the effectiveness of scientific teams.

The designers of groupware and collaboration support systems could use the demographic and structural variables of the model and the relationships among those variables in determining desired components and services of a system.

Future Research
• An analysis of the relationship between team composition and the quality of publications measured by some metric.

• Investigate dynamics of scientific teams, the structure and types of member relationships, and motivations for joining the team.

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