Assessing and Evaluating Multidisciplinary Translational Teams: A Case
Illustration of a Mixed Methods Approach and an Integrative Model

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Abstract

A case report is provided illustrating how multidisciplinary translational teams can be assessed at the outcome, process, and developmental levels using a mixed methods approach. Levels of evaluation appropriate for teams are considered in relation to relevant research questions and assessment methods, as well as their relative strengths and limitations. Examples are provided of how logic models can be applied to both scientific projects as well as team development, and serve to inform choices between various methods within a mixed methods design. Use of an expert panel technique is reviewed, culminating in consensus ratings of 11 multidisciplinary teams along specific scientific and maturational criteria, and a final evaluation within a team type taxonomy. Teams were designated as early in development, traditional, process focused, or exemplary, on the basis of team maturation and scientific progress. Lessons learned from data reduction, use of mixed methods, and use of expert panels are explored.

Keywords: team science, logic models, process evaluation, translational teams
Assessing and Evaluating Multidisciplinary Translational Teams: A Case Illustration of a Mixed Methods Approach and an Integrative Model

The growth in science and engineering research conducted by teams has dramatically accelerated since 1975 (Jones, Wuchy, & Uzzi, 2008), making multi-university collaborations the fastest growing authorship structure. This transition has been accelerated by the recognition that increasingly specialized scientific fields must develop collaborations to enhance creativity and accelerate the pace of discovery to address major societal health problems (Disis & Slattery, 2010). Research and intellectual property developed by highly functioning multidisciplinary research teams has greater impact in peer recognition through citations and patent uses than research products from siloed investigators (Wuchty, Jones, & Uzzi, 2007). As a result, major funding agencies are placing increasing emphasis on team science approaches in their funding portfolio. A notable example is the Clinical and Translational Sciences Award (CTSA), an initiative emerging from the NIH Roadmap (Zerhouni, 2006), intended to stimulate the speed and effectiveness of translational research (Woolf, 2008).

While definitions of different types of teams are numerous, work teams have been defined as an “interdependent collection of individuals who are responsible for specific outcomes for the organization” (Sundstrom, DeMuse, & Futrell, 1990, p. 120). Multidisciplinary research teams are a variant of work teams that focus on collaborative processes, which is a key component of team science (Hall, Feng, Moser, Stokols, & Taylor, 2008). Collaboration in the context of research teams involves having team members apply their unique expertise to the scientific problem, work separately, and then subsequently integrate their efforts, as well as share data and ideas (Bennett, Gadlin, & Levine-Finley, 2010).
Recently, an implementation model for multidisciplinary translational teams (MTTs) using the CTSA infrastructure has been proposed (Calhoun et al., 2013). The MTT is a unique hybrid structure that includes goals of both an academic research team in knowledge generation and training with those of a product-driven business team to develop a device or intervention for clinical translation. MTT design characteristics include a strategic core of multidisciplinary investigators dynamically engaged in training, capacity development and product generation (Calhoun, et al., 2013). The interdependence and heterogeneous membership promotes innovation and effectiveness (Van de Vegt & Janssen, 2003). The dynamic, multi-layered and stage-dependent processes engaged by MTTs pose major challenges in evaluating the processes, outcomes and skill acquisition of its members.

In this paper, we examine models, methods, and a case illustration of assessing and evaluating MTTs within the context of a CTSA environment. We use team assessment to refer to the collection of data to measure a team’s progress, and team evaluation to describe the process of determining significance of team activities. Several evaluation objectives are addressed by this paper. First, we attempt to identify and describe a variety of qualitative and quantitative methods useful to assess scientific teams at several different levels. Thus, a mixed methods approach to evaluating teams in a complex and changing environment is suggested, such that multiple levels of evaluation may be addressed. Second, we illustrate the use of data reduction processes involving various methods and multiple levels to evaluate team outcomes, team processes, and opportunities for team development. Last, we provide a case example of data reduction for team evaluation, using a proposed integrated scientific team evaluation model to facilitate helpful feedback and overall team management.
Assessing and Evaluating Team Science

The growth in the field of team science has now matured to the state where major themes and theoretical perspectives have been identified (Falk-Krzesinski et al., 2010; Stokols, Hall, Taylor, & Moser, 2008). Because much of translational research utilizes team science processes and structures (Börner et al., 2010), identifying the most appropriate evaluation models, methods and techniques are now needed (Hall, et al., 2008; Masse et al., 2008). Recent work illustrates a range of methods to evaluate scientific teams. Specifically, team science specific survey methods (Masse et al., 2008), social network analysis (Aboelela, Merrill, Carley, & Larson, 2007), action research (Stokols, 2006), interviews and focus groups (Stokols et al., 2003), and improvement-oriented approaches using multiple methods (Gray, 2008) in the evaluation of large scale and research centers. Börner, et al. (2010) and others (Klein, 2006; Stokols et al., 2003; Trochim, Marcus, Masse, Moser, & Weld, 2008) have therefore suggested that given the complexity and levels of interdisciplinary and team science, that a multi-method approach is necessary.

Considerable literature has been generated relative to the general effectiveness of teams (Cohen & Bailey, 1997; Guzzo & Dickson, 1996). Other attempts to synthesize team effectiveness research (Ilgen, Hollenbeck, Johnson, & Jandt, 2005; Mathieu, Maynard, Rapp, & Gilson, 2008) have examined studies investigating context, processes of team behavior, as well as outcomes of team functioning. With this synthesis has been the exploration of stages of team evolution and development (Wheelan, Davidson, & Tilin, 2003). Other efforts have described models of non-linear evolution (Gersick, 1991), as well as multiple, alternative pathways to maturation and development (Burke, Stagl, Salas, Pierce, & Kendall, 2006; Smith-Jentsch, Cannon-Bowers, Tannenbaum, & Salas, 2008). Such alternative models of team process,
functioning, and development are additional justification for the use of a mixed methods approach to assessment and evaluation.

While many of the findings and models of general team effectiveness have applicability to team science, much effort is needed to determine what components of team functioning and effectiveness are most applicable to translational science (Falk-Krzesinski et al., 2010; Rubio et al., 2010). The NIH Field Guide articulates a range of potential team considerations for translational science (Bennett, Gadlin, & Levine-Finley, 2010), and more recent efforts have been directed toward greater specificity in team membership, skill acquisition, team structure, and discrete team processes that should constitute the foci of translational science investigation and ultimately team evaluation (Calhoun et al., 2013). Given the need to assess team effectiveness as well as development, a mixed methods approach to the evaluation of MTTs is warranted (Falk-Krzesinski et al., 2011).

Types of Evaluation Appropriate for Multidisciplinary Teams

Levels of Evaluation

The selection of the appropriate evaluation framework is critically dependent on the anticipated purpose of the evaluation (Hansen, 2005). Given that MTTs are complex and dynamic entities operating within the context of the academic health center undergoing evolutionary, adaptive change in response to both internal and external factors focused on a translational intervention, our goal is to assess and evaluate MTT function, to quantify the MTT impact on translation, and to inform CTSA leadership on effective processes. These implementations would form the basis for systems-level interventions that should broadly facilitate other MTT translations within the CTSA (Calhoun, et al., 2013; Hall & Vogel, 2012).
To address the multiple levels involved in assessment and evaluation of a MTT, we draw on concepts and techniques from Outcome-based Evaluation, Process Evaluation and Developmental Evaluation. Table 1 illustrates these three team evaluative levels and addresses questions which we believe to be important for the evaluation of team science. The questions listed under the evaluation levels shown in Table 1 constitute core research questions for the evaluation of scientific teams, and suggest they can be useful for generation of evaluative criteria and choice of methods.

Outcome-based Evaluation is a systematic way to determine if a program has achieved its goals (Hoggarth & Comfort, 2010). For example, the CTSA consortium-adopted logic model (Frechtling, 2007) is a planning document that embodies the Outcomes-based Evaluation approach, where short, medium and long-term outcomes are identified and used to develop activities and inputs required to accomplish them (Hoggarth & Comfort, 2010). Some relevant assessment methods useful for quantifying MTT outcomes could include artifact/unobtrusive measures assessment, an assessment focused on the products of the MTT, or bibliographic assessment, a tool that would suggest the impact of the MTT in the larger scientific context.

By contrast, Process Evaluation is an iterative process that focuses on revealing program effectiveness (Saunders, Evans, & Joshi, 2005). Assessment methods relevant for Process Evaluation could include direct observation, structured interviews, surveys and social network analysis on program processes and program implementation. This information stimulates discussion, inquiry, and insight into adopting programmatic change. Crucial questions to be addressed by the Process Evaluation framework are shown in Table 1.

Developmental Evaluation is a technique focused on continuous improvement supporting team adaptation under dynamic and evolving conditions while the team is working (Patton,
Developmental Evaluation provides information on emergent processes that inform innovative approaches that generate insights into systems-level understanding of effective processes. In a manner distinct from Process Evaluation, this situation allows for direct, user-based feedback and focuses the participants to implement innovative change with the team. Questions to be addressed by Developmental Evaluation are shown in Table 1, with emphasis on roles, expectations and skill set development.

**Assessment Methods**

A range of social science research methods and designs are available to evaluation researchers (Gravetter, 2003; Trochim, 2005) which can be applied to the study of scientific teams (Hollingshead and Poole, 2012). We believe that there are eight assessment methods most applicable for team assessment, based on the needs of translational science and the available literature. Table 2 illustrates artifacts/unobtrusive measures, bibliographic measures, process observation, social network analysis, surveys, structured interviews, focus groups, and the case method. Each is described, their applicability to MTTs illustrated, and considerations of their use noted. Moreover, each method can be considered qualitative or quantitative, serving the needs of outcome, process, and developmental levels of evaluation. Finally, we present the strengths and weaknesses of each.

Based on the characteristics of these evaluation methods, we have incorporated components of the Outcomes-based, Process-based and Developmental Evaluation into a multi-level and mixed methods evaluation framework to assess and evaluate MTTs. However, mixed methods research, particularly as applied to evaluation research, requires integrative research designs, specific sampling strategies, sophisticated data analysis, and great care in inferring from the results (Creswell & Clark, 2011; Teddlie & Tashakkori, 2009). Mixed methods research
produces more evidence than either qualitative or quantitative approaches could by themselves, and the “combination of strengths of one approach make up for the weaknesses of the other approach” (Creswell and Clark, 2011, p. 2).

Case Illustration of Mixed Methods Assessment to Inform an Integrative Evaluation Model

Use of Logic Models

Recent evidence suggests that logic models can be applied to complex scientific endeavors (Norman, Best, Mortimer, Huerta, & Buchan, 2011). Two specific logic models were developed for each MTT. First, each Team Principal Investigator and Team Project Manager developed a project-based logic model that addressed the CTSA-collaborative project. In these cases, logic models depicted short term (1-3 years), medium term (4-6 years), as well as long term (7-10 years) outcomes that reflected anticipated changes in standards of care, diagnosis, management of specific disease populations, as well as stated recognition within a given scientific or treatment community. Shown in Figure 1 is an example of a project-based logic model from a burns injury and metabolic response MTT. The leadership of each MTT subsequently developed metrics and a measurement plan to document and track their progress. Thus, logic models were used to guide efforts addressing questions depicted in Table 1 at the outcome level of analysis.

A second logic model was generally developed for all MTTs to evaluate processes and developmental outcomes involving a seven step team development cycle as shown in Figure 2, inclusive of team establishment and vision, team process surveys, team self-assessment, developmental plans, team coaching, team behavior observation, and external review. Specific metrics and a measurement plan were developed for all MTTs universally, and reflected both
qualitative and quantitative measures. This second type of logic model involved those questions involving team process and team development shown in Table 1.

**Choice of Assessment Methods**

Given the chosen levels of assessment and the number of methods utilized, a mixed methods approach was operationalized. The research questions in Table 1 are illustrative of a mixed methods approach because “they help blend the two approaches (qualitative and quantitative) from the outset of the research” (Teddlie & Tashakkori, 2009, p. 126). Thus, these questions, and attendant logic model metrics, specified how the qualitative and quantitative sources of data could be integrated together to address questions that could otherwise not be addressed by independent means. Inspection of the questions depicted in Table 1 were specifically designed to address whether MTTs were progressing scientifically as well as maturing as social entities (i.e., multidisciplinary teams).

Shown in Table 3 are the specific criteria that were operationalized (by method, qualitative and quantitative designation, and level of assessment). We assessed MTTs primarily using artifacts, process observation, surveys, and bibliographic means. Thus, the methods ranged from highly quantitative surveys to highly qualitative thematic analysis reports generated by an experienced observer of scientific groups.

Illustration of a more quantitative method involved a survey designed to measure team processes. In this case, we administered the “Our Team Survey,” a web-based team assessment which has been validated across numerous types of work teams (Wilson, 2003). The Our Team Survey consists of 71 items measuring 14 different factors of team processes. Each factor is scaled from zero to seven. As shown in Table 3, six specific factor scales were used to inform our select criteria, inclusive of clarity of goals and priorities, consensus planning, management
feedback, team atmosphere, domination, and management support. Figure 3 depicts the results from the Our Team Survey consisting of team leaders/principal investigators and team members (scientists). Team members reported increases in perceptions of clarity of goals, consensus planning, team atmosphere, recognition, and reduced perceptions of tension/stress and leader domination over a two year period.

Illustration of a more qualitative method is shown in Figure 4, depicting components of a team development planner. Here, ranking scales and identification of developmental goals for a given team is illustrative of “information that is presented in both narrative and numerical forms” (Teddlie & Tashakkori, 2009, p. 129). These data were used to populate portions of the Maturation/Development criteria (e.g., new opportunities, challenges) depicted in Table 3.

**Data Reduction Process**

Given the large amount of potential useful qualitative and quantitative data, only select scales and select questions were used to inform specific criteria shown in Table 3 (i.e., research/scientific and maturation/development factors). For example, only certain scales (e.g., domination, consensus, and management support) from the quantitative Our Team Survey were used to describe transformative and empowered leadership. An example of how each team’s vision and goals were assessed involved using stated goals in progress reports and in team agendas, which were qualitative in nature. Data illustrating each of the four research/scientific factors and the four maturation/development factors were separately compiled for each MTT.

**Creation of an Evaluation Model for Scientific Teams**

While the many general reviews of team research (Cohen & Bailey, 1997; Guzzo & Dickson, 1996; Ilgen, Hollenbeck, Johnson, & Jandt, 2005; Sundstrom, DeMuse, & Futrell, 1990) have well documented different types of teams (e.g., technology teams, work teams, self-
managed teams), these team categories do not serve well the nature and variation of scientific teams. Perhaps the closest description of a scientific team category is that of an ad-hoc project, where a team exists for only a finite time to solve problems and interact with internal and external constituents (Devine, Clayton, Phillips, Dunford, & Melner, 1999). Related to potential ways of examining scientific teams, Guimera, Uzzi, Spiro, and Nunes Amaral (2005) have suggested the use of a team’s network structure based on disciplinarity, and Stokols, et al. (2008) have suggested seven contextual influences on transdisciplinary team effectiveness.

Unfortunately, there is no universally accepted model or criteria that is entirely team-specific that is useful to distinguish scientific teams categorically. While there are many suggestions for potential evaluation criteria, and while many argue for useful methods and processes for evaluation of team science (Falk-Kresinski, et al., 2011; Hall, et al., 2008; Rubio, et al., 2010), the many levels and many potential methods available renders this task problematic. There is a tremendous need therefore for an evaluative model that is specific to scientific teams. Such a model is necessitated by the goals of the NIH (Zerhouni, 2006) which focuses on team based initiatives and their evaluation. Practically speaking, a common framework is much needed to provide guidance in data reduction and criteria variability. Given the potential for increased competitiveness and reduced resources, the ability to evaluate teams categorically and along their growth needs is much needed.

Based on the four research/scientific factors and the four maturational/developmental factors, we established a prototype evaluation model to be used to synthesize the reduced assessment data into an overall team evaluation. We desired to create a model that not only differentiates between teams on our eight criteria, but also could be graphically displayed to team leaders, team members, and external parties. A two-by-two matrix was constructed to depict
teams as one of four types: an exemplary team, a process team, a traditional team, and an early in
development team. These team types result from assessing teams and subsequently evaluating
them along a continuum of high to low on their team maturation/developmental factors and high
to low on their research and scientific progress. For example, exemplary teams would be high in
both research and scientific progress assessed using reduced data along the criteria involving the
research plan, the research generated, the communication and program growth, progress across
translational domains, as well as vision, charter, goals, transformative and empowered
leadership, meeting management and coordination, and external communication and
collaboration.

**Use of an Expert Panel**

The use of expert panels to evaluate research proposals, grants, and programs is well-
established within the scientific community (Coryn, Hattie, Scriven, & Hartman, 2007; Lawrenz,
Thao, & Johnson, 2012). Following the recommendations of Huutoniemi (2010) and Klein
(2006), we utilized expert panels to judge the reduced assessment data and to balance the
objective data with contextual specificity and interdisciplinary focus. Our expert panel included
the Principal Investigator, the Director and Assistant Director of Research Coordination, a
consulting team coach, and a consulting evaluator, representing a range of disciplines (medicine,
clinical research, psychiatry, psychology, and management).

The expert panel was provided logic models and measurement plans for each team, as
well as assessment data and reports generated from the various methods shown in Table 3. Each
expert panel member was asked to independently review all the assessment data and determine
an initial rating of each of the 11 teams assessed using a scoring template as shown in Figure 5.
Here, each expert panel member rated a given team’s performance as 0 (not present), 1 (low), 2
(medium), or 3 (high). Thus, each team could be given a score of zero to twelve for each of the two criteria categories (research/scientific and maturation/development) by summing the subscore for each specific criterion (e.g., research plan). Panel members were instructed to thoroughly review all data provided for each team, and then evaluate each team through the completion of a scoring template (Figure 5) for each team. Members of the expert panel were next assembled, and each presented their initial ratings on the maturational/developmental and research/scientific progress factors. After each panel member articulated their view, differences in the ratings were discussed, assessment data reexamined, and a panel consensus was reached.

**Results of Mixed Methods Data Synthesis**

Figure 6 illustrates the results of the expert panel evaluation results. Five teams were placed in the “early in development” category (i.e., low in team maturation/development and high in research/scientific progress), one team was categorized as a “process focus” team (i.e., high in maturation/team development, low in research/scientific progress), and three teams were categorized as “exemplary” (high in team maturation/development and high in research/scientific progress). Two teams were combinations of team types.

Due to the number of teams judged to be “early in development,” the 11 teams were then illustrated by their categorization resulting from evaluation, and their relative tenure. Because the MTTs consisted of existing research teams with a relatively long history (over 5 years), maturing teams (between 3-5 years), and new teams (less than 3 years), the distribution shown in Figure 7 suggests that MTTs are sensitive to their maturational stages when evaluated.

**Lessons Learned and Conclusions**

Developing a robust and uniform strategy for assessing and evaluating translational teams will be a key for process improvement for the CTSA program. Assessment of translational teams
is a specialized case due to their academic missions and product-focused health outcomes. The non-linear nature of MTT development consisting of dynamic cycles of activity (i.e., team development) makes the establishment of an overall evaluation model problematic. The finding that team tenure was central to team evaluation is illustrative.

Several lessons were learned from this effort. First, it is a practical necessity to use a mixed methods design when applying three levels of evaluation (Greene, Caracelli, & Graham, 1989; Johnson, Onwuegbuzie, & Turner, 2008). Trochim et al. (2008) have shown the value of integrated mixed methods approach in outcomes-based evaluation of disciplinarity. Program evaluation based on quantitative measures, such as improvements in population health are too long term to provide meaningful dynamic input to realistically inform changes in MTT processes over shorter grant cycle times. Instead, we propose that qualitative assessment of the academic environment would provide more useful information. In fact, structured interviews of the impact of the adoption of MTTs within a CTSA reveal a striking cultural change (Kotarba, Wooten, Freeman, & Brasier, 2013). Additionally, the adoption of a translational intervention by practitioners, patients, and communities requires qualitative assessment of needs. For these reasons, we suggest that mixed methods evaluation will provide the most meaningful evaluation of MTTs.

Second, selection of evaluation criteria is critical. While there is no established evaluative model, we found it useful to limit the number of criteria such that it could be used to inform a model that is easy to use and easy to understand. While a broadened array of criteria for contextual and collaborative variables are available (Stokols, et al., 2008), each CTSA should select the evaluative criteria that best relate to its overall objectives. However, achieving a balance between the more traditional scientific criteria with social-psychological criteria will
play an important role in facilitating the goals of training and capacity building that is desired by
the NIH. Additionally, reduction of data to select criteria is the only feasible way to utilize
graphic models of evaluation as reported here. Perhaps agreement on the overall dimensions
(scientific and maturational), along with flexibility in the choice of specific criteria to evaluate
such overall dimensions, might provide both consistency and flexibility desired by all.

Third, effective data reduction and facilitation is essential to enabling expert panels to
consider and evaluate teams using multiple and complex criteria. Providing flow charts and
indices explaining how data are reduced to address specific criteria, providing examples, and
facilitating the panels in an unbiased and egalitarian manner may hold the key for future use. We
propose that expert rater panels may be an effective means to reinforce ideal MTT processes.
However, the use of expert panels to effectively evaluate teams will require substantive research
and investigation. Reviews of the process involving expert rater panels (Olbrecht & Bornman,
2010) have found them plagued by inconsistencies, politics, low reliability, and a variety of
group based decisional and cognitive biases. Thus, while we used mixed methods, used specific
evaluation factors and criteria, reduced the data for independent rating of each team, the use of a
consensus seeking model for team evaluation and categorization is worthy of further
investigation. Such a model may be prone to numerous biases, yet does allow for an in depth
understanding from the unique perspectives of each expert rater.
References


Table 1

*Multiple Levels of Team Evaluation and Exemplary Questions for Translational Science*

<table>
<thead>
<tr>
<th>Outcome Evaluation</th>
<th>Process Evaluation</th>
<th>Developmental Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are agreed upon milestones and timelines being achieved?</td>
<td>How is the team interacting and communicating?</td>
<td>How are task-related behaviors at each stage of</td>
</tr>
<tr>
<td></td>
<td>Are meetings regular, agenda-based, and well attended?</td>
<td>development being performed?</td>
</tr>
<tr>
<td>Are agreed upon outcomes (e.g., publications, patents, training, etc.) being</td>
<td>Are internal and external parties being engaged</td>
<td>How are roles we expect members to fulfill being</td>
</tr>
<tr>
<td>addressed?</td>
<td>collaboratively?</td>
<td>performed?</td>
</tr>
<tr>
<td>Are innovations or breakthroughs that are translational in nature being achieved?</td>
<td></td>
<td>How are individual and team expertise being developed?</td>
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</table>
Table 2

Assessment Methods for Multidisciplinary Translational Teams

<table>
<thead>
<tr>
<th>Method</th>
<th>Potential Use with Scientific Teams</th>
<th>Considerations in Use with Scientific Teams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artifacts/Unobtrusive Measures</td>
<td>Can be used primarily for outcome and developmental evaluation</td>
<td>Inexpensive and easy to collect</td>
</tr>
<tr>
<td></td>
<td>Helps team reflect upon performance and plan for future</td>
<td>May be inconsistently available</td>
</tr>
<tr>
<td>Bibliographic</td>
<td>Can be used primarily for outcomes and developmental evaluation</td>
<td>Inexpensive and easy to collect</td>
</tr>
<tr>
<td>Quantitative Method using frequency and impact of publication, number of citations, number of patents, number and size of extramural grants</td>
<td>Helps to determine knowledge generation and traditional progress and impact</td>
<td>Controversial given use of different indices, changing impact ratings and factors</td>
</tr>
<tr>
<td>Process Observations</td>
<td>Can be used primarily for process and developmental evaluation</td>
<td>Requires trained observers and is time intensive</td>
</tr>
<tr>
<td>Qualitative Method unless validated scales are utilized to assess and rate team communication, leadership, collaboration, and process issues (trust, dysfunction)</td>
<td>Helps teams identify process effectiveness, role analysis, and stimulate inquiry to barriers to scientific achievement</td>
<td>May be seen by team leaders and members as intrusive and controlling</td>
</tr>
<tr>
<td>Method</td>
<td>Potential Use with Scientific Teams</td>
<td>Considerations in Use with Scientific Teams</td>
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<tr>
<td>------------------------------</td>
<td>------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------</td>
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<tr>
<td>Social Network Analysis</td>
<td>Can be used primarily for process and developmental evaluation</td>
<td>Relatively inexpensive to collect (surveys of documents), but may require expertise to analyze</td>
</tr>
<tr>
<td></td>
<td>Provides visual and statistical snapshot of group functioning and effectiveness of relationships, information flow, and collaboration</td>
<td></td>
</tr>
<tr>
<td>Surveys</td>
<td>Can be used primarily for process and development evaluation</td>
<td>Inexpensive way to collect large amounts of data covering many areas</td>
</tr>
<tr>
<td></td>
<td>Helps team see objective data that is self-generated and other generated (e.g., 360 survey)</td>
<td>Self-report might lead to bias and unreliability, surface level assessment of deep structure team processes</td>
</tr>
<tr>
<td>Structured Interviews</td>
<td>Can be used primarily for process and developmental evaluation</td>
<td>Time consuming, expensive, and can be subjective</td>
</tr>
<tr>
<td></td>
<td>Can help team understand complex behaviors from thematic content and provide contextual understanding of thoughts, symbols, cognitive structures, frames of reference, etc.</td>
<td>Can be useful to diagnose issues missed by other more objective means and measures due to follow-up and clarification opportunities</td>
</tr>
<tr>
<td>Method</td>
<td>Potential Use with Scientific Teams</td>
<td>Considerations in Use with Scientific Teams</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Focus Groups</td>
<td>Can be used primarily for process and developmental evaluation</td>
<td>Relatively inexpensive, but requires significant time of participants</td>
</tr>
<tr>
<td></td>
<td>Helps team understand “grounded” problems or issues from own experience and seek consensus</td>
<td>May be difficult to use with politically charged issues, directive leadership, and may be difficult to provide information that is amenable to categorization</td>
</tr>
<tr>
<td>Case Method</td>
<td>Can be used for outcomes, processes, and developmental evaluation</td>
<td>Expensive and time consuming</td>
</tr>
<tr>
<td></td>
<td>Helps team see life cycle of events and generate informed causal inferences concerning team effectiveness</td>
<td>May require periods of time that limit usefulness to changing team members and structures</td>
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<tr>
<td></td>
<td>Qualitative Method using small groups of representative participants/constituents to seek understanding of a select problem, issue, or process</td>
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<tr>
<td></td>
<td>Qualitative Method used to describe and chronicle events, activities, processes, and results of teams and groups through collection of documents and interviews retrospectively</td>
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Table 3

*Evaluation Factors Used to Evaluate Multidisciplinary Translational Teams*

<table>
<thead>
<tr>
<th>Research/Scientific Factors (Criteria)</th>
<th>Methods Used</th>
<th>Qualitative/Quantitative</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Plan</td>
<td></td>
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<tr>
<td>Novel and sophisticated plan, conceptually and/or technically</td>
<td>Artifacts (scored grant application, annual progress reports)</td>
<td>Qualitative and Quantitative</td>
<td>Outcome</td>
</tr>
<tr>
<td>innovative</td>
<td></td>
<td></td>
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<tr>
<td>Research Generation</td>
<td></td>
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<tr>
<td>Productivity, data collection, analysis, and appropriate use of</td>
<td>Artifacts (completion of formal milestones; accomplishment of short, medium,</td>
<td>Qualitative and Quantitative</td>
<td>Outcome</td>
</tr>
<tr>
<td>key resources</td>
<td>and long term outcomes; time and resource utilization)</td>
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<td></td>
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<tr>
<td>Research Communication/ Program Growth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Progress in dissemination, publication, and grant success</td>
<td>Bibliographic (number of publication, impact of publications, grants obtained</td>
<td>Quantitative</td>
<td>Outcome</td>
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<td></td>
<td>extramurally)</td>
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<tr>
<td>Progress Across Translational Domains</td>
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<tr>
<td>Clinical and community impact</td>
<td>Artifacts (completion of formal milestones; accomplishment of short, medium,</td>
<td>Qualitative and Quantitative</td>
<td>Outcome</td>
</tr>
<tr>
<td></td>
<td>and long term outcomes)</td>
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<tr>
<td>Maturation/ Development Factors (Criteria)</td>
<td>Methods Used</td>
<td>Qualitative/Quantitative</td>
<td>Level</td>
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<td>------------------------------------------</td>
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<tr>
<td>Team Vision, Charter, and Goals</td>
<td></td>
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<tr>
<td>Well established identity, future that is</td>
<td>Artifacts (annual progress reports,</td>
<td>Qualitative and Quantitative</td>
<td>Process</td>
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<tr>
<td>shared by all, resulting from team</td>
<td>meeting notes)</td>
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<tr>
<td>deliberations</td>
<td>Survey (web based scales involving consensus, clarity of goals/priorities)</td>
<td>Qualitative</td>
<td>Process</td>
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<tr>
<td>Transformative and Empowered Leadership</td>
<td></td>
<td>Qualitative</td>
<td></td>
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<tr>
<td>Leader solicits input, integrates</td>
<td>Process Observation (team coach observations of team principal investigator and project manager behavior/collaboration)</td>
<td>Quantitative</td>
<td>Developmental</td>
</tr>
<tr>
<td>perspectives, and facilitates consensus</td>
<td>Survey (web based scales involving consensus, domination, management support)</td>
<td></td>
<td>Process, Developmental</td>
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<tr>
<td>Meeting Management and Coordination</td>
<td></td>
<td>Qualitative</td>
<td></td>
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<tr>
<td>Team members meet regularly and explore</td>
<td>Process Observation (team based observations of team interaction patterns and decision making)</td>
<td>Quantitative</td>
<td>Process, Developmental</td>
</tr>
<tr>
<td>new opportunities, challenges, and</td>
<td>Survey (web based scales involving clarity of goals, management feedback, team atmosphere)</td>
<td></td>
<td>Process, Developmental</td>
</tr>
<tr>
<td>synergies</td>
<td>Artifacts (team development planners, needs assessment/self-assessment)</td>
<td>Qualitative</td>
<td>Process, Developmental</td>
</tr>
</tbody>
</table>
Table 3 (cont.)

<table>
<thead>
<tr>
<th>Maturation/ Development Factors (Criteria)</th>
<th>Methods Used</th>
<th>Qualitative/Quantitative</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Communication and Collaboration</td>
<td>Facilitated communication with collaborators that enhances research productivity</td>
<td>Qualitative and Quantitative</td>
<td>Process</td>
</tr>
<tr>
<td></td>
<td>Artifacts (annual progress reports, meeting notes)</td>
<td>Qualitative</td>
<td>Process, Developmental</td>
</tr>
<tr>
<td></td>
<td>Process observation (team coach observation of inclusion of disciplines)</td>
<td>Qualitative</td>
<td></td>
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</tbody>
</table>
Figure 1. Project based logic model for burns injury and hypermetabolic response team.
Figure 2. Generic developmental logic model for multidisciplinary translational teams.
Figure 3. Survey based results for multidisciplinary translational teams.
**FACTOR 1: TEAM VISION, CHARTER, AND GOALS (THE BEDROCK: DEFINES TEAM DIRECTION)**

*Rank (3, 2, 1) (1=most effective, 3=least effective, needs development)*

- [ ] MTT-specific translational research vision and goals (e.g., milestones and timelines)
- [ ] Articulated project outcomes and metrics
- [ ] Outline plan to develop MTT-specific processes and capabilities

**Developmental Goals for Overall Team Vision, Charter, and Goals**

<table>
<thead>
<tr>
<th>Developmental Issue(s)</th>
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<tbody>
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</table>

**Developmental Objectives**

1. 
   
2. 

**How do you plan to address these issues and address these objectives?**

*Objective 1*

**Plan**

**Timeline**

**Resources Needed**

*Figure 4.* Team development planner for multidisciplinary translational teams.
Figure 5. Scoring template for multidisciplinary translational team evaluation.
Figure 6. Simplified team evaluation model matrix distribution.
Figure 7. Distribution of multidisciplinary translational team evaluations by team tenure.