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F.I.R.E. experiment planning and reporting structure

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F.I.R.E. Experiment Planning and Reporting Structure

by

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13. ABSTRACT (Maximum 200 words.)

The FORCEnet Innovation and Research Enterprise (FIRE) knowledge management system is used for operational experiment planning and reporting.   The system has a prescribed structure that includes forms and database reports for all planning and reporting elements. This report described the structure, the planning process, and provides directions for the input to be provided for each planning element.

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FIRE Experiment Planning and Reporting Structure
Guidelines – June 2007

Section 1. Introduction

The experimentation structure utilizes three planning forms and two reporting forms. Figures 1 and 2 show their content. Brief content descriptions accompany the figures. Complete descriptions are in following sections.

Objective Planning	Data Planning	Analysis Planning
Objective	Auto-Fills	Auto-Fills
Objective-Question	Events	Measures Procedures
Attributes	Situations	Survey Procedures
Measures	Collection Procedures	Obj-Quest Procedures
Surveys	Collector Instructions	Objective Procedures
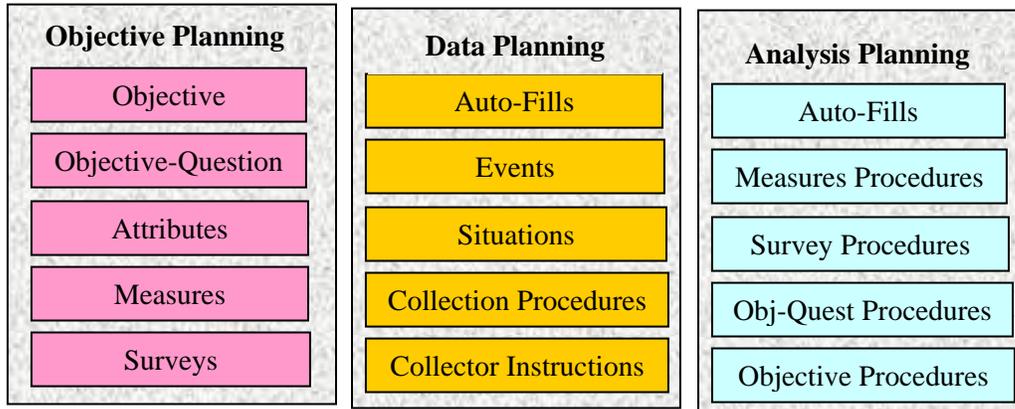
Figure 1. Schematic of FIRE planning forms.

Objective planning specifies what is to be learned and how that will be done. What is to be learned is specified by an Objective and associated Objective-Questions. Attributes to be addressed are contained in the Objective-Question; their Measures and Data sources for those measures are also specified. Some Attributes will be addressed with survey questions.

Data planning specifies the events and situations that are needed to produce the required data. Also included are data collection procedures and collector instructions that direct their activities. The data planning procedure and form are called **ThreadEx.**

Analysis planning specifies the procedures for producing the various quantitative measures and how subjective survey information is to be processed. Also included are procedures for producing the answers to the objective-questions and for the status of the objective.

Thread Results	Objective Results
Auto-Fills	Objective Result
Measures Results	Context
Survey Answers	MUA Recommendation
Context	
Obj-Quest Answer	
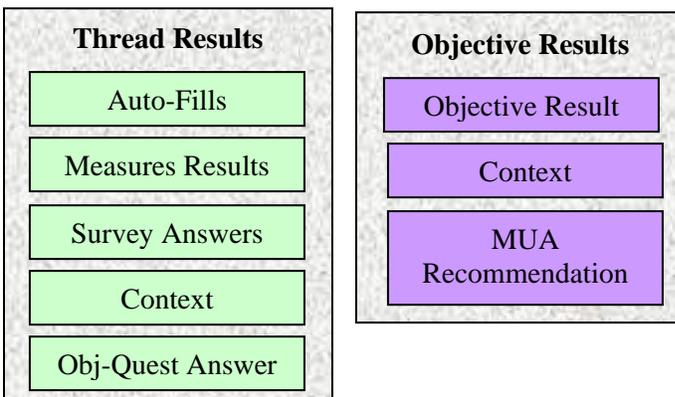
Figure 2. Schematic of FIRE results reporting forms.

There is a set of the first four forms for each experiment **Thread**. The fifth form is for Objective results, which is a fusion of the results from all of its Objective-Questions.

> A **Thread** is an Objective-Question and its set of specific measures, surveys, situations, and data needed to answer that Objective-Question.

The Thread results form includes measures, processed survey answers, the complete answer to the Objective-Question, and the context under which these results were produced.

The Objective results form is different than the other forms because it does not refer to a Thread and, hence, does not contain a Thread # (see below for a description of the Thread #). Also, it is in the FIRE collaboration workspace, not under the FIRE Focus Area tab as are the other forms.

There is a substantial amount of information that is auto-filled from one form to another for those forms that contain a Thread #. This is indicated in the above schematics. The information that is shared is shown in later sections.

1.1 Holistic and Sequential Planning

The three planning forms are set up for both sequential and holistic planning.

Sequential Planning:
> Define Objective, input to FIRE >
>> Specify Objective-Questions, input to FIRE >
>>> Etc. down to data to be captured.
>>>> Later, find out data can't be obtained >
>>>>> Go back and redo >
>>>>>> Iterate until done.

Holistic Planning:
> Look across the full spectrum of planning elements to insure, as much as possible, that the full Thread can be accomplished.
>> Insure all planning elements fit to produce the information desired.
>>> Proceed to provide input to FIRE.
>>>> Later modification may be needed as things change.

Holistic planning usually produces an adequate plan more efficiently. The forms are structured and linked in such a way that holistic planning is facilitated. The basic Objective planning components are included in all planning forms, can be edited in any form, so that one does not have to cycle through the forms to insure a well structured and achievable Thread.

Holistic planning can be done at any point in the planning process, and applying it several times is beneficial. At the outset of planning the following aspects should be considered:
- What do we want to learn, or want to accomplish?
- Why do we need to learn that?

- What sort of information do we need?
- What data do we need to capture to produce that information?
- What sort of situation is needed, and what events need to occur, to produce that data?

These questions are linked. Consider all of these aspects, play them against each other to insure you have a complete overview before getting into sequential planning details. Without such an overview, much planning time will be wasted and the experiment may never come together correctly. Take opportunities during all planning phases to look across all components to insure they fit, that required information can be produced.

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Section 2. Planning Elements

Planning elements are those quantities that define the information needed from the experiment, what is to be done with it, and the required results. The planning elements are:
- Objective
- Objective-Question(s)
- Attributes and Measures
- Survey Questions
- Situations
- Events
- Data
- Analysis Methods

Several results are reported. They are:
- Measures
- Processed survey question answers
- Objective-Question answer
- Context and its impact on results
- Objective status
- MUA recommendations

This section describes each of these elements in some detail. The next section provides descriptions of the input format and content for each to be provided in FIRE.

2.1   Objective and Objective-Question

Objectives:
- An Objective is a high-level purpose, usually to provide an operational capability or develop a system-level capability.
- The Objective statement does not address specific solutions to provide that capability. That is a lower-level consideration.
- A Focus Area can have one or several Objectives.

Objective-Questions:
- Objective-Questions address specific elements that are needed to achieve the Objective, to provide the capability.
- An Objective can have one or several Objective-Questions.
- Each Objective-Question addresses specific attributes of objective development that are being examined.
- The attribute(s) for which measures are to be obtained must be contained in the Objective-Question statement.
- Objective-Questions often address specific systems or processes.
- An Objective-Question asks whether a needed development has been achieved.

- An Objective-Question can pose only one question; multiple-statement questions are not allowed, but the question can address several attributes/measures (see below).

> **Objective-Questions are stated in such a way**
> **that they lead directly to the desired measures.**

2.2 Experiment Threads

Each Objective-Question defines an experiment Thread. Each Thread consists of a connected set of planning components, shown in Figure 3.
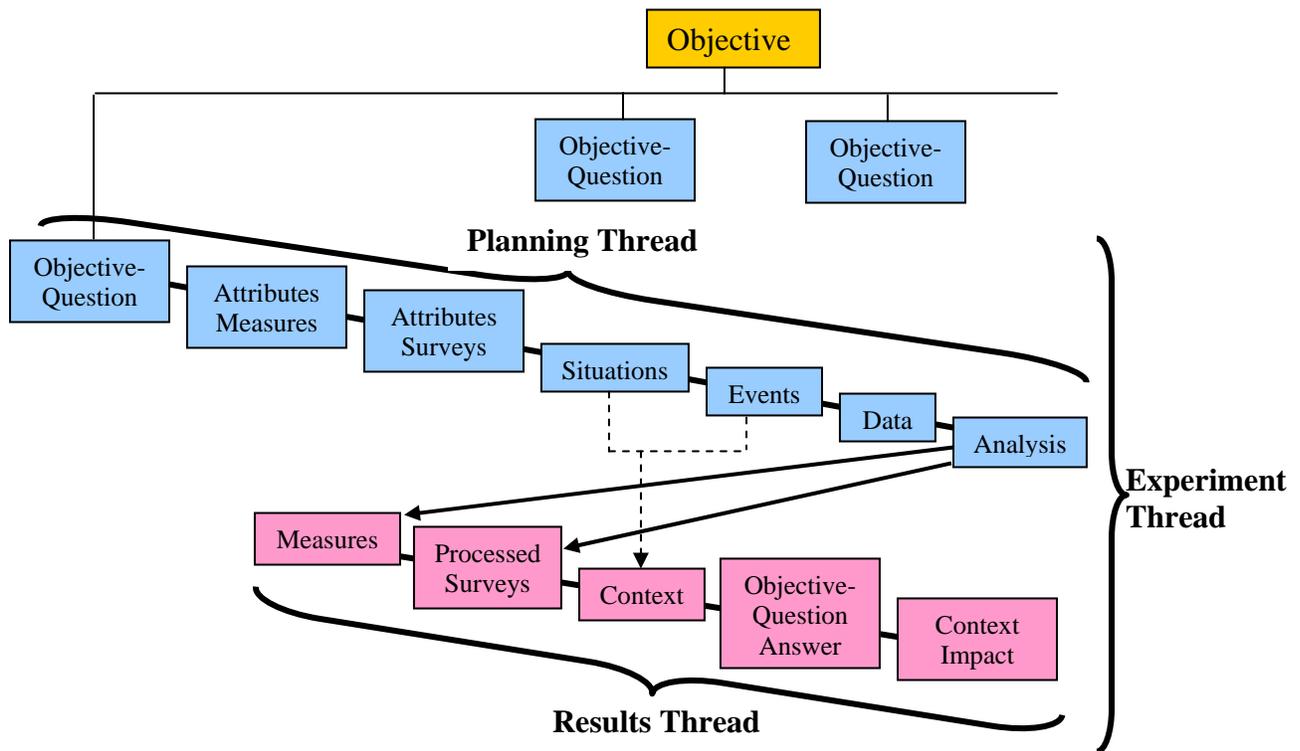
Figure 3. Components of an Experiment Thread.

Objective results report the status of the Objective. They are a fusion of the results for its component Objective-Questions (the fusion of the results from one or more experiment Threads). This is illustrated in Figure 4.
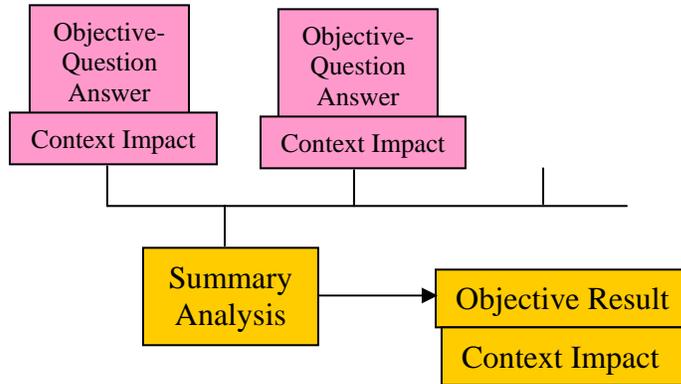
Figure 4. Fusion of results from multiple Threads to produce Objective result.

2.2.1   Thread Numbering
Each Thread is given a code: E.g.,
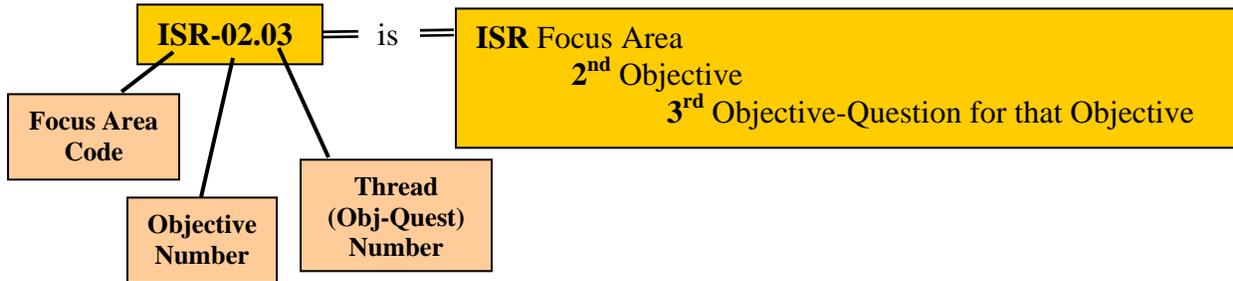
Figure 5. Thread # code.

The Thread # is the first information on all forms and summaries. It is the key used for archiving and retrieval of information to/from the FIRE database.

> Objective Statement Rule: Threads in a Focus Area that have
> the same Objective # must have the same Objective statement.

2.3   MOP, MOE, Military Utility, and Attributes

Measures are experimentation's blood. This brief discussion sets the stage for how measures are handled in the FIRE forms. The terms MOFE, MOE, and MOP are in common use and we introduce the additional measure: MOU. These are

- MOFE = Measure of Force Effectiveness
- MOU = Measure of Utility
- MOE = Measure of Effectiveness
- MOP = Measure of Performance

MOFE is used when determining the effectiveness of a force's conduct of operations.

MOU is a measure of the Utility of a system or process for supporting operational activities.

Whether a measure is an MOE or MOP is not fixed. It depends on the specific learning that is being undertaken. The following measures descriptions reflect this fact in the two different treatments of MOE. This use is what is set up in FIRE.

- MOE – "Effective" is used as an attribute only when overall effectiveness of system, people, or process to perform its **stated mission** is to be evaluated.

- MOE – (other than Effective) specific measures of a c**omponent** of performance effectiveness. This may be a roll-up of performance measures.

- MOP – direct measure of a specific **performance parameter** (people, process, or system).

2.3.1   Attributes, Measures, and Their Relationship

Attributes and measures are intimately linked; they are different ways of expressing the same thing.
- Attributes are single-word expressions of the characteristics of people, things, or processes.
- Measures provide attribute quantification.

In what follows, the terms attribute and measure will be used almost interchangeably.

Table 1 shows the three-level attribute/measure structure that is in use for experimentation and implemented in FIRE.

X Effective			
X Accessible	X Reliable	X Capable	X Usable
X Capacity	X Robust	X Sufficient	X Clear
X Available	X Persistent	X Flexible	X Trusted
X Compatible	X Secure	X Accurate	X Manageable
X Extensive	X Assured	X Timely	X Relevant
X Efficient			X Compliant

X Military Utility			
X Improved	X Needed	X Applicable	X Desired

Table 1. Effectiveness and Military Utility attributes.

The FIRE Objective input form has a check box for each attribute, used to indicate which attributes are desired.

Following the measures descriptions shown above, attributes are used as follows:

- MOE – Effective is checked when a roll-up for overall effectiveness is desired.

- MOE – These measures are the components of effectiveness:
    - Accessible   **You can get to it**.
    - Reliable   **It is there when needed**.
    - Capable   **It/he/she/they can do its job**.
    - Usable   **You can use it**.

- MOP – The performance measure attributes that are components of the four MOE are listed under each of the MOE in Table 1. E.g., Robust, Persistent, Secure, and Assured are components of Reliable.

2.3.2   Military Utility

Military Utility is a special attribute. It is a judgment that there is utility (which needs to be described) in military use of the system or process.

- MOU – are those characteristics that are used to determine the overall utility for supporting operational activities. The four MOU are:
    - Improved   improves the performance of operational activities
    - Needed   fills a gap in current capabilities
    - Applicable   can be applied to activity performance
    - Desired   operational personnel want the capability

- Effectiveness is an internal attribute. It has to do with how well something performs its function.

- Utility is an external attribute. It has to do with how well something contributes to another function, in this case to a military activity.

There is currently no MOP equivalent level for Military Utility. It is expected that most of the utility determinations will be subjective.

Objective determinations can be made, e.g., the number of times a capability is used as a measure for Desired. MOP under the MOU attributes will be developed as experience allows.

Two rules when using military utility as an attribute are:
- The specific operational activity (task) must be specified in the Objective.
- It must be a separate Thread. It is not appropriate to use the same Thread to determine effectiveness and utility.

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3. Measures, Questions, and Data Sources

Each attribute contained in the Objective-Question has an associated measures and data tail. (The term "measures" is use loosely because some of the information to be gathered will be subjective opinions.) Where the data/information will come from that produces each measure has to be defined.

3.1 Quantitative Measures and Subjective Questions

An Attribute specifies what is to be determined but not specifics. The specific determination can be objective or subjective or both. Data sources are:

- Objective determinations (quantitative measures)
    - System Log
    - Chat Log
    - Observer logging time-stamped events

- Subjective determinations (opinions)
    - SME-observer answering attribute questions
    - Operator answering attribute questions

It is also possible to process subjective determinations, such as many people providing answers to survey questions, into quantitative measures (such as averaged responses to an opinion scale).

For any Thread, one or more of these determinations can be specified. Both objective and subjective determinations can be specified for the same attribute.

3.2 Specifying Measures

Sufficient information about the measures must be provided so that data to be captured is clearly specified. This means specifying exactly what is to be measured and with what instrument. E.g.,

Attribute = Timely   MOP = Timeliness

Specific measures: a. Time from submission of RFI to receipt of information.

b. Time information waits in queue for transmission.

c. RFI processing time.

Each of these measures can be determined by data from system or event logs.

Subjective determinations also require specificity, which is done by providing the question to be asked. E.g.,

Attribute = Timely   Subjective Determination

  Specific questions: a. Was the information timely?
          (poor question, no specifics provided as to what timely means)

          b. Was mensuration information received in time to meet
           MAAP cut-off?
          (good question, meaning of timely is well defined)

It is important that there be no ambiguity as to what is desired, what data and determination are needed.

3.3 Chat as a Data Source

Chat has multiple uses in experimentation.
- Real-time experiment control.
- Real-time operator collaboration.
- Information source for experiment analysis.
- Data source for experiment analysis.
- Experimented with for its own capabilities determination (same as any other system).
- Source for context information.

The use of Chat for data and information acquisition is complex because very time-consuming mining and extraction are required. Context information is somewhat simpler to extract but is still time-consuming. The major key to extraction is correlating time stamps with data and information events of interest.

Because of the work involved in extracting information from Chat it is important to be careful to specify exactly what is to be extracted and design the experiment event so that the needed information in the Chat log can be easily located. Two examples follow.

  Example 1: Chat is specified to determine the time lapse between collaboration events. This is straightforward and reasonable. One does have to insure that the specified events are addressed during the appropriate Chat session.

  Example 2: An appropriate question for an experiment could be "Is COP information clear?" One could look in Chat to attempt to answer that question. No further specification than the question makes obtaining the information difficult and open to interpretation. It is best to instruct the analyst in what to look for with a carefully crafted measure.

E.g.   Measure = number of instances of requests for clarification of information.

The analyst has to go into the Chat log and look for those instances, but a measure is now specified and what is to be looked for is specific.

Context Mining: Chat is very useful for this purpose. One often looks for instances of systems down, operator overload, operator confusion.

Operational Activity/Human Performance: Chat contains a wealth of information about

- How well operational activities are proceeding.

- How well humans are performing their tasks.

- The level of SA/SU.

Information can be extracted about these and related matters. As noted above, such extraction is difficult and well-crafted measures must be specified or the information extracted will be suspect and of limited value.

Conclusion: The first reaction to using Chat as an experiment data source should be to not do so. If the decision is made to do so, carefully craft the measures to be determined and how the appropriate information/data will be extracted as a prerequisite to using this source.

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Section 4. Analysis Planning

Experiment Analysis can be simple or extremely complicated, depending on the number of measures to be evaluated and their types. This section shows the types of analyses that are required for various measures specifications.

Important to remember in analysis planning is that everything points toward answering a specific question. One is dealing with an inverted tree, as shown for a simple case in Figure 6.
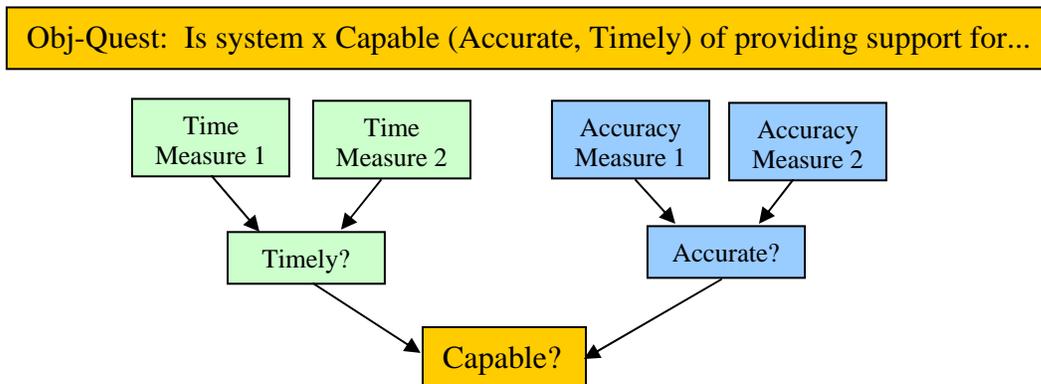
Figure 6. Analysis process to distill measured results into Objective-Question answer.

If a combination of subjective and objective measures are specified, the analysis can become quite complicated. ***Truly frightening*** is Figure 7 at the end of this section, which shows how complex analysis can become if planners turn themselves loose and plans for multiple subjective and objective measures for a Thread.

4.1   MOE and MOP Analysis Implications

The choice of attributes and measures has implications for analyses to be done. Some consequences from checking various attributes are:

- If a single MOP is checked, only its measures are required, but there may be more than one measure (e.g., there can be several time measures for timely).
    - There can be more than one type of determination for the MOP. Both an objective measure and a subjective opinion could be specified.

- If multiple MOPs are checked, the above applies for each.

- If an MOE, and only the MOE, is checked a subjective opinion will be specified because no MOP is being specified to support it.

- If an MOE is checked, and also some of its MOPs, then
    - MOP measures are to be determined and a roll-up of those measures into the MOE determination is to be done.

       o   It is also possible, in addition, to specify a subjective determination of the MOE.

- If Effective, and only Effective, is checked a subjective opinion will be specified because no supporting MOEs or MOPs are to be determined.

- If more attributes are checked with Effective then
  - At least one of them must be an MOE.
  - In this case a full roll-up to effectiveness is required.
  - The rules above apply.

4.2   Analysis Planning Components

Analysis is the most difficult part of an experiment to plann because so many details are required. Specific analyses must be planned for:
- Each measure, and fusion if needed
- Each survey question, and fusion if needed
- Each Objective-Question
- The Objective
- Context

The most difficult analysis to conduct is a roll-up of different types of information. Consider a particular attribute that has several measures and questions associated with it. The following could be needed:

Attribute 1

Measure 1a	Measure Value	Two measures from different sources.
Measure 1b	Measure Value	Need procedure for combining.
Question 1A	Question Answer	
Question 1B	Question Answer	Same deal for combining question answers.

               Attribute Roll-Up of all the above

And there may be several attributes, requiring their roll up for the Objective-Question. Thus all of the following could be required:
- Attribute: roll together measures and answers into single determination.
- Objective-Question: roll together attributes into single answer/determination.
- Objective: roll together Objective-Question results into Objective status.

If all of the above are required for an Objective with many Threads, and complex Objective-Questions the analysis can be quite complex. Avoiding overly complex analyses is a good reason to keep planning elements simple.

The following figure diagrams the analysis procedures. Full complexity is illustrated.

Only two threads are shown for the objective, there can be any number.

All possible types of data that produce information for Thread-1 are shown. There are almost no cases where all types are needed.

The complex analysis process needed to fuse many types of information is an argument for keeping the number of types small. **Keep it simple**.
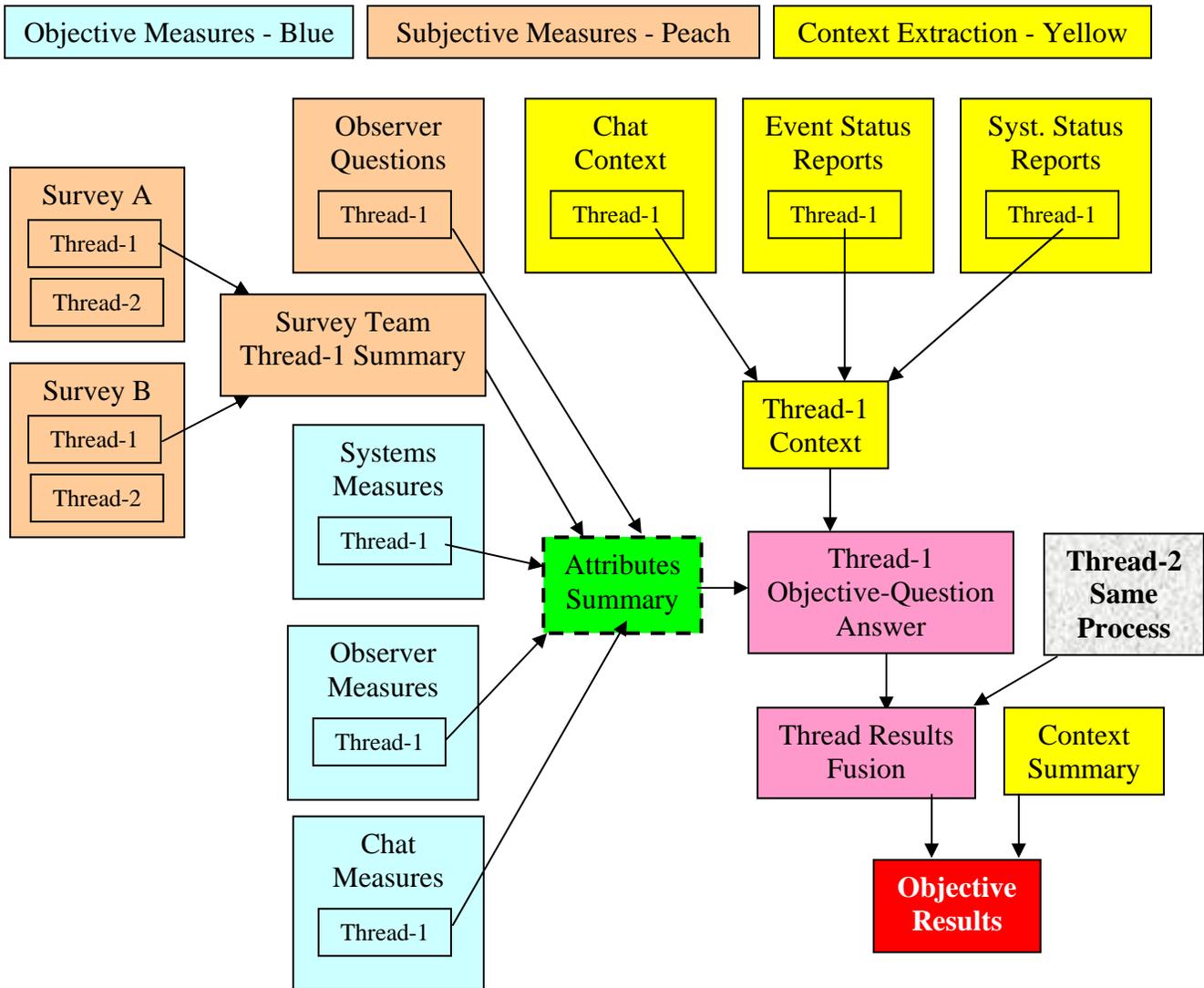
Figure 7. Analysis plan structure, overly complex case.

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Section 5. Results Elements

There are three phases of results reporting:
- Production of measures, processed question answers, and context.
- Analyses to produce Objective-Question answers, Objective status, and context impact.
- Report development: quick look, program reports, experiment final report.

Results production is a product of analyses, so the information in this section closely follows that in the former. It is duplicated included here, more briefly, so that this section stands on its own.

The first-level results to be produced are:
- Each measure specified
    - System log measures
    - Chat log measures
    - Observer event measures
    - If more than one measure source is specified, a fusion of those measures may be needed.
- Each question asked, with specific reference to the attribute
    - SME observer answers
    - Operator answers
    - If more than one answer source is specified, a fusion of those answers may be needed.
    - Answers may be processed, such as average response on a scale.
- Context/situation under which information/data was obtained
    - System status
    - Operator status
    - Procedures used

The second-level results to be produced are:
- Objective-Question answer, with elaboration
- Context impact on the Objective-Question answer.

The third-level results to be produced are:
- Objective status
- Context impact on Objective status
- Recommendation to the MUA board.

All of the above results are input to FIRE. The first two levels are placed in FIRE forms. The third level is in spreadsheets in the TACFIRE TW workspace.

4.1   Planning to Reporting Process

The following figure shows how various planning components can be used to produce the final report. Thorough writing during planning can greatly aid final report production.
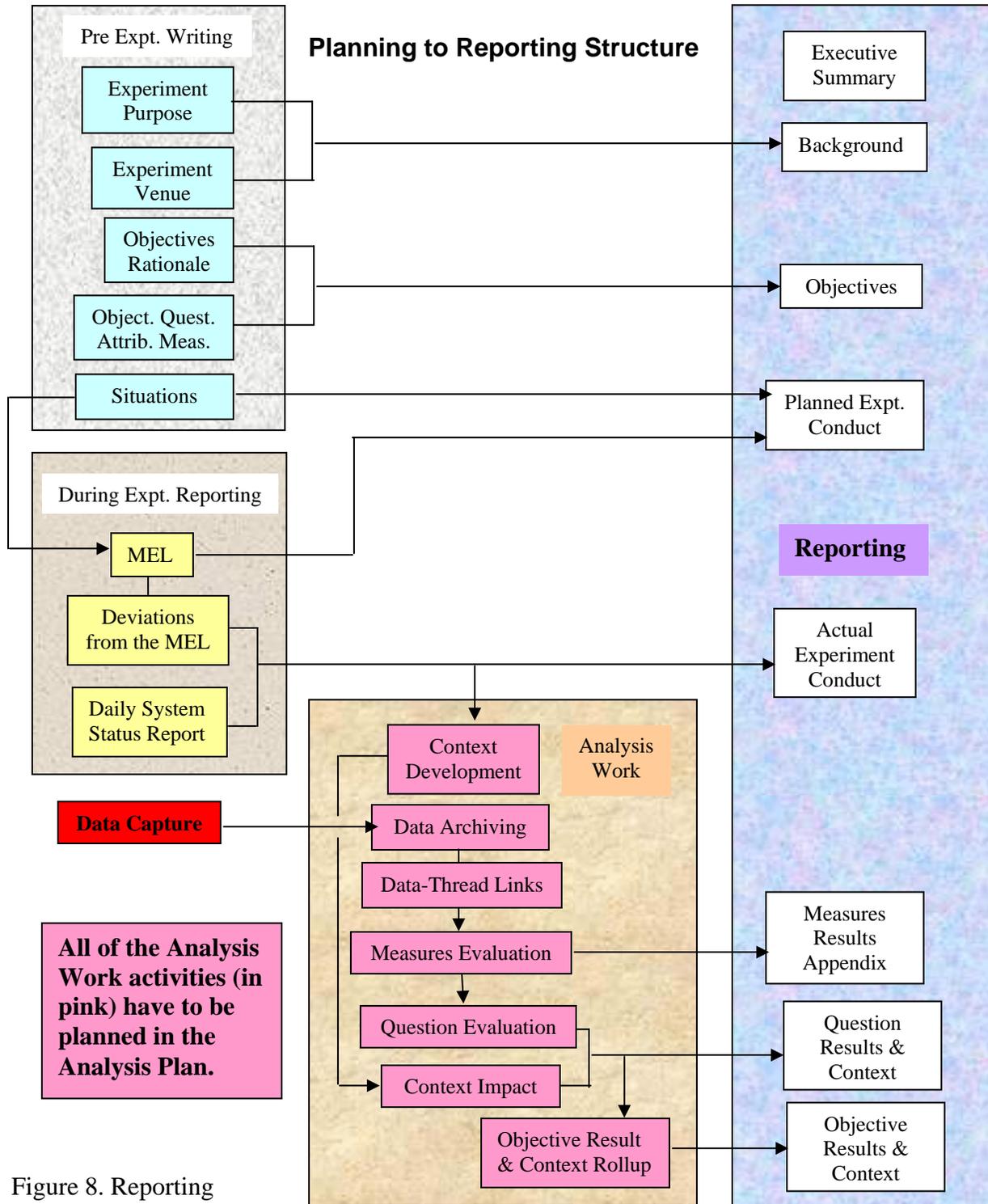
Figure 8. Reporting

Section 6. Workflow: FIRE and TACFIRE Workspace

There are two principal areas where experiment planning and reporting work occur.
- FIRE – Standard planning **forms**, entry of prescribed planning and reporting elements.
- TACFIRE – Workspace containing **folders** for communication, living spreadsheets, documents, minutes.

The FIRE forms have been described generally above. The workspace has a set of prescribed folders that are set up by the FIRE managers for specific uses. Users who have the appropriate authorization may create other folders within this prescribed structure, as needed. It is important that the prescribed folders be used for their specified purposes, that the assigned information not be placed in other folders.

Figure 9 illustrates how forms and folders are used throughout the experimentation process. For
    Forms labeled "By Focus Area" and
    Folders labeled "Focus Area Folders"
there is a form set or included folder for each Focus Area.

Folder content descriptions:

Meetings: Meeting invitations, descriptions, minutes, presentations.

Focus Area: One folder for each Focus Area for archived communications, documents, files, things pertinent specifically to that Focus Area. Sub-folders may be created for a Focus Area if needed.

Plans: Specific planning documents that need to be shared and updated as the experiment is being developed. Most of the documents will be spreadsheets. Included are the Install Matrix, Manning Matrix, Master Event List, etc.

Survey Builder: Surveys are currently built in Survey Builder. Whether this folder will be needed is uncertain.

Data: All Data is placed in a folder for the Focus Area for which it was generated. There are sub-folders for each data type: system, chat, observer, survey. There is also a folder for daily summaries (any type such as daily equipment status, SME observations, MEL deviations).

Results: Each Focus Area has a folder. These are Objective-level results. The folders contain spreadsheets into which are entered Objective status, context impact, and MUA recommendations.

Experiment Documents: General documents that describe the purpose, overall structure, guidelines for the experiment as a whole.

FIRE Forms ═══ **Work** ═══ **Workspace Folders**

Experiment Documents
Overarching Information

Meetings
CDC, IPC, MPC, FPC, etc.

Planning Forms
1. Objective
----
2. Events
----
3. Analysis

By Focus Area

Objective & Data Planning

Focus Area
Communications, Comments, Files

Focus Area Folders

Survey Building

Plans
MEL   Systems
Ship Schedules, Laptops, Installs, Manning, etc

Survey Builder
Where?

Execution

Data Archiving

Data
Daily Summaries

System, Chat, Observation, Survey

Focus Area Folders

3. Analysis Tracking
(same Analysis form)

By Focus Area

Analysis

4. Results Forms
Measures
Processed Surveys
Objective-Question Answer
Context and its Impact

By Focus Area

Results Development

Results
Objective Status
Context Impact
MUA Recommendations

Focus Area Folders

Figure 9. Prescribed Forms and Folders and Their Use.

A separate document provides directions for access to and use of the workspace.

Section IV. Access to FIRE Forms and Summaries

Each of the forms shown schematically in Figure 1 are in FIRE (except for Objective results which are in the TACFIRE workspace). For each there is an input/edit form and a summary report that shows the information currently in the database. This section describes these forms and summaries and how to access them. The following section provides directions for the various inputs.

There are two user types and they have different access. Referring to Figure 10, access is as follows:
- Create New Thread   Lead only
- Print Friendly-Lead View   Lead only
- Print Friendly-General View   All
- Form Edit Link (on summary form)   Lead only
- Analysis Planning Tab   Lead only

If a general user attempts to access a area for which they are not authorized, a prompt will appear that says access denied.

Figures 10 and 11 show screen captures of the Objective planning summary form and input/edit form. Text is included that shows input to be provided for this particular set. The Thread # used for this illustration is C2-01.01.

This form is accessed as follows:
- Click on the "TW08" link in the left, blue, navigation bar.
- Click on the "Focus Areas" tab at the top of the page.
- Click on the next-level red tab for the Focus Area desired.
- The Objective Summaries page for that Focus Area will appears.

Navigation to the various forms and summaries occur from this level.
- To start a new Thread: click on the "Create New Thread" link.
- To access ThreadEx or Results forms and summaries: click on the appropriate blue tab.
- To access the edit form for a Thread: click on the "Form Edit Link" number in the summary.

Reviews appear <u>only</u> at the end of the edit form and in the Printer Friendly-Lead View. The general viewer summaries do not contain these reviews.

Index Number – Whenever a new Thread is created it is assigned an Index #. This number appears at the top of all summaries and is the "Form Edit Link".
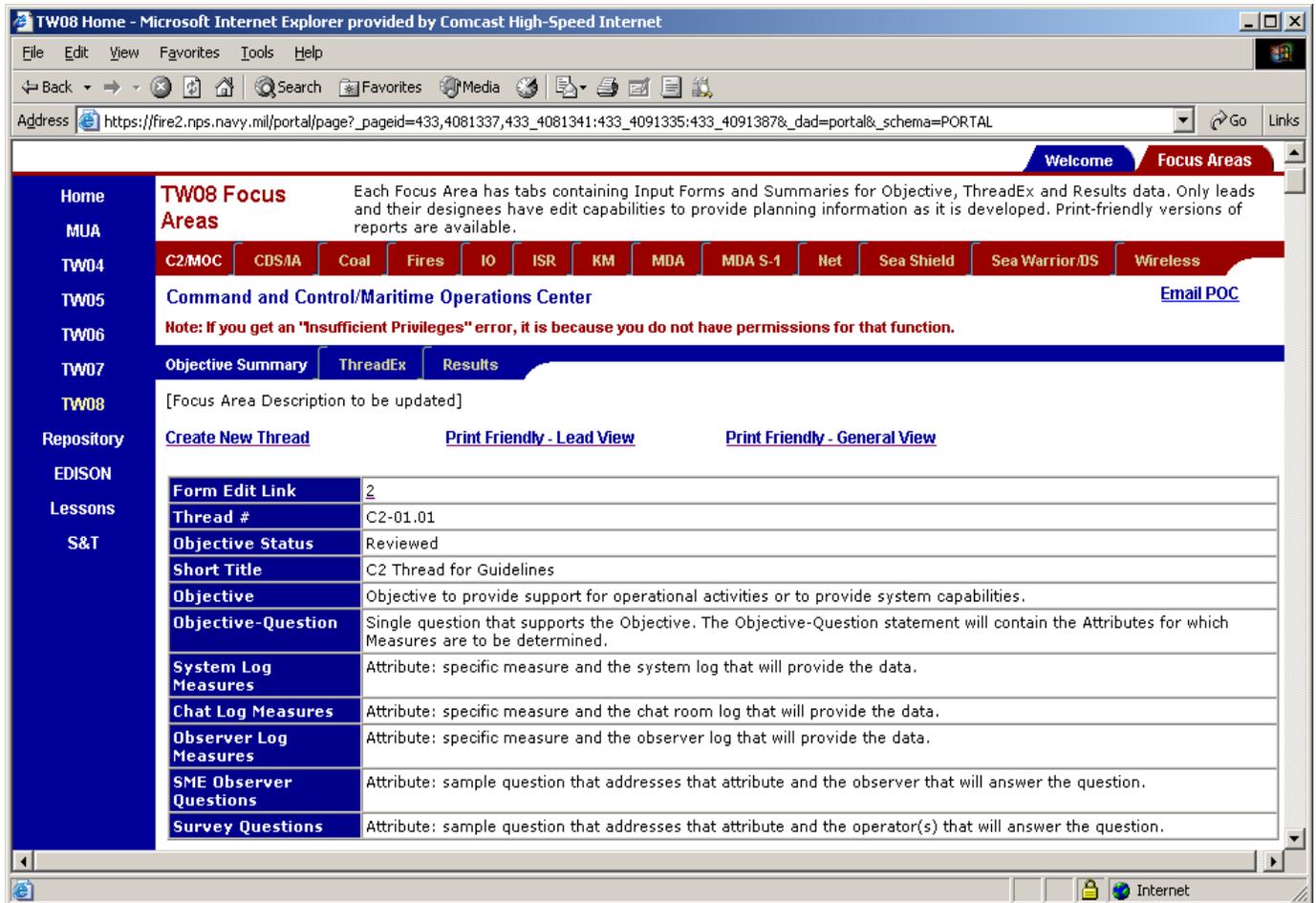
Figure 10. Screen capture of a FIRE summary form.

The edit form for this Thread is shown in Figure 11.   The full form is not shown.

The form is divided into logical sections with blue headers above each section. E.g., quantitative measures are a section. Some of the headers have brief directions for the input to be provided.

The proper format for the Thread # is shown. If this format is not followed the number will be rejected. Duplicate numbers will also be rejected.

Check boxes for the desired Attributes are in the middle of the form. Accessible, Accurate, and Timely have been checked. This indicates that a subjective question about accessibility and measures for accurate and timely are desired.

The attribute check boxes appear only in the objective input/edit form. Those attributes to be examined are typed into the text areas, as shown, and this is where they are seen in subsequent forms and reports.

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Thread # C2-01.01   ex. (C2-##.##)   Objective Status Reviewed ▾

Short Title C2 Thread for Guidelines

Objective: 1 sentence, Operational or Development, same objective # = same objective statement.

Objective   Objective to provide support for
                 operational activities or to provide

Objective-Question: 1 sentence, single question, include attributes.

Objective-   Single question that supports the Objective.   The Objective-Question
Question   statement will contain the Attributes for which Measures are to be
                 determined.

Effective Attributes: Attributes for the Effectiveness Measures to be determined. Indicate by checking.
Check "Effective" when effectiveness rollup is desired, etc. for it's top 4 attributes.

☐ Effective

☑ Accessible   ☐ Reliable   ☐ Capable   ☐ Usable
    ☐ Capacity   ☐ Robust   ☐ Sufficient   ☐ Clear
    ☐ Available   ☐ Persistent   ☐ Flexible   ☐ Trusted
    ☐ Compatible   ☐ Secure   ☑ Accurate   ☐ Manageable
    ☐ Extensive   ☐ Assured   ☑ Timely   ☐ Relevant
    ☐ Efficient   ☐ Compliant

Military Utility Attributes: Must be a separate Thread for these attributes. Indicate by checking.
Check "Military Utility" when utility rollup is desired.

☐ Military Utility

        ☐ Improved   ☐ Needed   ☐ Applicable   ☐ Desired

Specific QUANTITATIVE Measures with their Data Source

System Log   Attribute: specific measure and the system log that will provide the
Measures   data.

Chat Log   Attribute: specific measure and the chat room log that will provide
Measures   the data.

Observer Log   Attribute: specific measure and the observer log that will provide
Measures   the data.

Figure 11. Initial Thread input form and Objective edit form.

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7.1 Status Report

The status of planning and of results development, for each Focus Area, is shown under its Status tab. Shown are the status chosen from the drop-down in the planning input/edit form. Table 2 is a mock-up of the summary.

Status Report	(Focus Area Name)			
Thread	Objective	ThreadEx	Analysis	Results
NN-01.01 NN-01.02 … … …	Complete Modified Reviewed	Complete Reviewed	Etc.	

Table 2. Schematic of FIRE status report.

8. FIRE Forms and Summaries Content

Hybrid mock-up displays of the input/edit forms and summaries are presented in Tables 3 - 6. Real FIRE forms are shown only in Figures 10 and 11. The following format is used:

- Text area titles are in black (or blue if linked to other forms).
- Headers are in red. (Headers are only in the input/edit forms.)
- **Status** drop-down and reviewer comment text areas are the same in all forms, thus are shown only in the Objective Planning display.

Those text areas that are linked to those in other forms are so indicated. All of the information in the Objective summary is replicated to the other forms except status.

Those text areas that are linked between forms can be edited in any form and the edited text will be updated in all forms and summaries. This facilitates holistic planning.

8.1   Objective Planning FIRE Form and Summary

Status is input by three choices from a drop-down. "Reviewed" means that the reviewer wants modifications made. "Modified" means that the lead has made the recommended modifications. "Complete" means that the reviewer is satisfied with the input. The reviewer's comments are provided at the end of the form

The other information to be input has been well described earlier in this report. Very brief information is provided below.

There is a text area, with directions for the Objective and Objective-Question.

The next section contains the check-boxes for attributes.

This is followed by a section for the three types of quantitative measures:
- System Log
- Chat Log
- Observer Log

The last section before the reviewer's comments is for subjective opinions:
- SME Observer questions
- Operator survey questions

Objective Planning Spreadsheet	
Thread #	Linked to other forms
Status	Indicate the current status by choosing correct drop-down. Reviewed Modified Complete
Objective	Objective: 1 sentence, Operational or Development, same # = same statement Linked to other forms
Objective-Question	Objective-Question: 1 sentence, single question, include attributes. Linked to other forms

Effective Attributes: Attributes for the Effectiveness Measures to be determined. Indicate by checking.
Check "Effective" when effectiveness rollup is desired, etc. for its top 4 attributes.
Effective
 	
  Accessible   Reliable   Capable   Usable
    Capacity   Robust   Sufficient   Clear
    Available   Persistent   Flexible   Trusted
    Compatible   Secure   Accurate   Manageable
    Extensive   Assured   Timely   Relevant
    Efficient   Compliant
 	
Military Utility Attributes: Attributes for the Effectiveness Measures to be determined. Indicate by checking.
Check "Military Utility" when utility rollup is desired.
Military Utility
 	
    Improved Needed Applicable Desired	

Specific QUANTITATIVE Measures with their Data Source	
System Log Measures	Linked to other forms
Chat Log Measures	Linked to other forms
Observer Log Measures	Linked to other forms
Specific SUBJECTIVE / QUALITATIVE Questions with their Information Source	
SME Observer Questions	Linked to other forms
Survey Questions	Linked to other forms
Reviewer's Comments. Choose Modified status when review changes have been made.	
Objective and Objective-Question Review Comments	
Attributes, Measures, Questons Review Comments	

Table 3. Objective Planning hybrid representation.

8.2   ThreadEx FIRE Form and Summary

Planning for the events, conditions, and data to be captured is done using the ThreadEx input/edit form and summary. (ThreadEx means definition of the details of the Thread for the experiment.) This planning is to set up the proper circumstances so that the data needed to evaluate the measures can be obtained. Figure 8 is the mock-up of the FIRE ThreadEx format and following are general explanations of its various planning sections.

The Objective, Objective-Question, and the desired measures and questions are repeated in this form for reference during this stage of planning (and so that modifications to them can be made in this form rather than having to return to the Objective form).

The first input section provides description of the events.
- General Description
- Date
- Thread Frequency/Duration

This information is used in forming the experiment Master Event List (MEL).

Next are the conditions.
- Operational Conditions – what the operating forces are to be doing and where.
- System Conditions – what systems are to be in use and how configured.
- Information Conditions – what information is to be "flowing" and its characteristics.

Finally are participant's instructions. These are directions for what they are to do during experiment execution, and also immediately after for that part of reporting that immediately follows experiment completion.
- Participant Status – where to be, when.
- Instructions/Procedures – what to do.
- Data Collection Instructions – what media for collection, how to transport, where to store.
- Reporting Instructions – daily status, next-day needs, post-experiment information delivery.

ThreadEx	
Thread #	Linked to other forms
Objective	Linked to other forms
Objective-Question	Linked to other forms
ThreadEx Coordinator	
General Description	
Date	
Thread Frequency/Duration	
Conditions to be set so needed data can be captured.	
Operational Conditions	
System Conditions	
Information Conditions	
Data / information to be captured for specific measures/questions, by type.	
System Log Measures	Linked to other forms
Chat Log Measures	Linked to other forms
Observer Log Measures	Linked to other forms
SME Observer Questions	Linked to other forms
Survey Questions	Linked to other forms
Instructions to experiment participants.	
Participant Status	
Instructions / Procedures	
Data Collection Instructions	
Reporting Instructions	

Table 4. ThreadEx hybrid representation.

8.3   Analysis Planning FIRE Form and Summary

Analysis specification can be lengthy because of the need to produce several types of results. Lowest-level results:
- Measures values.
- Question answers.
- Fusion of measures and answers into attribute evaluations.
- Determination of the context/situation/special circumstances that were encountered.

Higher-level results:
- Objective-Question answer through roll-up of attribute evaluations.
- Impact of context on the Objective-Question answer.
- Objective status.
- Impact of context on the Objective status.

For each of the measures and questions the procedures for their determination, procedure status, and the person responsible for carrying out the analysis are provided. The same planning is provided for the Objective-Question and the Objective.

CONTEXT:

An important part of analysis is to determine the context/conditions under which the information was obtained:
- Conditions under which information was captured for each Thread.
- Deviations from the planned conditions are the most important to record.
- Impact of these conditions on the results for each measure, if any.
- These conditions provide the overall context for the Thread.
- Context impact on the Objective-Question (validity, caveats, etc.).
- Context impact on the Objective (roll-up of impacts on the individual Objective-Questions).

ANALYSIS STATUS:

Analysis status is slightly different than the status for Objective Planning and ThreadEx. Status for Objective and ThreadEx is for quality of the planning. For Analysis, status is provided for both the quality of the analysis plan and for status of results production. Reviewer comments switch from one to the other once the experiment is completed and analysis begun.

Analysis Planning		
Thread #	Linked to other forms	
Procedures for producing specific quantitative measures.		
Measures from system logs.		
System Log Measures	Linked to other forms	
System Analysis Procedures		
System Analysis Status		
System Analyst		
Measures from Chat logs.		
Chat Log Measures	Linked to other forms	
Chat Analysis Procedures		
Chat Analysis Status		
Chat Analyst		
Measures from Observer logs.		
Observer Log Measures	Linked to other forms	
Observer Measures Analysis Procedures		
Observer Measures Analysis Status		
Observer Measures Analyst		
Procedures for producing qualitative attribute results through questions.		
Attribute results from SME/Observer answers to questions.		
SME Observer Questions	Linked to other forms	
SME Questions Analysis Procedures		
SME Questions Analysis Status		
SME Questions Analyst		
Attribute results from operator answers to survey questions.		
Survey Questions	Linked to other forms	
Survey Question Analysis Procedures		
Survey Analysis Status		
Survey Analyst		
Procedures for aggregating measures and question results into the Objective-Question answer.		
Aggregation Procedures		
Thread Context Procedures		
Objective-Question	Linked to other forms	
Objective-Question Analysis Procedure		
Objective-Question Analysis Status		
Objective-Question Analyst		
Procedures for aggregating Objective-Question answers into Objective result.		
Objective	Linked to other forms	
Objective Analysis Procedure		
Objective Analysis Status		
Objective Analyst		

Table 5. Analysis planning hybrid representation.

8.4 Results Reporting FIRE Form and Summary

Results are realized through the planned analyses, so their components closely follow analysis components. Thus, what is shown immediately below for results form input has the same titles as for analysis, except here it is the values that are provided vice the process to produce them.

Basic results are:
- Measures values.
- Question answers.
- Fusion of measures and answers into attribute evaluations.
- Determination of the context/situation/special circumstances that were encountered.

The next levels of results are:
- Objective-Question answer through roll-up of attribute evaluations.
- Impact of context on the Objective-Question answer.
- Objective status.
- Impact of context on the Objective status.

Results	
Thread #	Linked to other forms
List of all quantitative measures that were produced by analysis.	
System Log Measures	Linked to other forms
System Log Measures Values	
Chat Log Measures	Linked to other forms
Chat Log Measures Values	
Observer Log Measures	Linked to other forms
Observer Log Measures Values	
List of all subjective results, by question, that were produced by analysis.	
SME Observer Questions	Linked to other forms
SME Observer Answers	
Survey Questions	Linked to other forms
Survey Answers	
Context when information was captured, Objective-Question answer, and context impact.	
Thread Context	
Objective-Question	Linked to other forms
Objective-Question Answer	
Context Impact	

Table 6. Objective-Question results hybrid representation.

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Section 9. Input Field's Content Directions

Following are tables that contain brief directions for the inputs to be provided in each text field. Each table is for one input/edit form.

- When formats are shown they must be followed.

- Those inputs in blue and bold are shared across multiple forms and may be edited in any of the forms in which they appear.

Example Threads with correct planning content are presented in Section 10.

9.1   Objective Planning Input Directions

Objective Planning Input Directions	
Thread #	Thread identifier using specified format.
Status	**Planning components status**. Choose status from the drop-down. Only Reviewer can choose Reviewed or Complete. **Reviewed =** review has been conducted and modifications are needed. **Modified** (Lead or SME use only) = modifications have been made in response to reviewer's comments and another review is needed.
Short Title	**Two or three word title**, used as a shorthand reference to this Thread. Each Thread must have a unique Short Title.
Objective	**High-level statement of an operational or developmental purpose.** Only a single sentence allowed. All Objectives with the same Objective number must have the same statement. Details of specifics to be determined go in the Objective-Question. An Objective can have several Objective-Questions.
Objective-Question	**Each Objective-Question contributes to achieving the Objective**. There may be several Objective Questions for an Objective. Only a single question is allowed for each Thread. If more than one question is needed, use multiple threads. The attributes for the measures to be obtained must be in the question. Sufficient detail is provide in the question to guide formulating needed measures.
Attributes	**Check the attributes for which measures are to be determined**. This information is for reference when providing measures input below. It is not replicated on other sheets.
System Log Measures	**Specific QUANTITATIVE measures to be determined from electronic system logs**. Specify the system log from which data will be obtained. Format "Attribute: System: measure description, second measure description;". e.g., Timely: GCCS: elapsed time between information sent and received, elapsed time between information received and displayed.
Chat Log Measures	**Specific QUANTITATIVE measures to be determined from Chat logs**. Specify the Chat Room from which the log is to be obtained. Format "Attribute: Chat Room: measure description; second measure description; etc". e.g., Reach: IRS Analysts: number of people using chat as a function of situation. Efficiency: IRS: number of mouse clicks required to log on.
Observer Log Measures	**Specific QUANTITATIVE measures to be determined from SME-Observer logged event information.** Specify the logger who is to record the information. Format "Attribute: Logger: measure description, second measure description;". e.g., Timely: UAV Observer: elapsed time between request for imagery and target obtained, elapsed time between target obtained and image chipped, elapsed time from image obtained and image sent.
SME Observer Questions	**Specific questions to be answered by an SME-Observer (SUBJECTIVE)**. Specify the SME. Format "Attribute: SME: question, second question;". e.g., Timely: CIC Observer: Was information available in time for Commander's briefing? Sufficient: J3 Observer: Was there sufficient information to provide the needed situation assessment?

Survey Questions	**Specific questions to be answered by operator survey (SUBJECTIVE)**. Specify the operators to be surveyed. In most cases the SME and Operator questions will be the same. Format "Attribute: personnel: question, second question;". In most cases the SME and Operator questions will be the same. e.g., Timely: CIC personnel: Was information available in time for Commander's briefing? Sufficient: J3 analysts: Was there sufficient information to provide the needed situation assessment?
Obj & Obj-Quest Review Comments	**Reviewer guidance for needed input modifications.** This review is for Short Title through Objective-Question. Choose the appropriate status drop-down after review or modifications.
Attrib, Meas, Quest Review Comments	**Reviewer guidance for needed input modifications.** This review is for Attributes, Measures, and Questions. Choose the appropriate status drop-down after review or modifications.

Table 7. Directions for Objective planning input.

9.2 ThreadEx Input Directions

ThreadEx Input Directions	
Thread #	Thread identifier using specified format.

Status	**Planning components status**.
	    Choose status from the drop-down.
	    Only Reviewer can choose Reviewed or Complete.
	    Reviewed = review has been conducted and modifications are needed.
	    Modified (Lead or SME use only) = modifications have been made in response to reviewer's comments and another review is needed.

Short Title	**Two or three word title**, used as a shorthand reference to this Thread. Each Thread must have a unique Short Title.

Objective	**High-level statement of an operational or developmental purpose.**
	    Only a single sentence allowed.
	    All Objectives with the same Objective number must have the same statement.
	    Details of specifics to be determined go in the Objective-Question.
	    An Objective can have several Objective-Questions.

Objective-Question	**Each Objective-Question contributes to achieving the Objective**.
	    There may be several Objective Questions for an Objective.
	    Only a single question is allowed for each Thread. If more than one question is needed, use multiple threads.
	    The attributes for the measures to be obtained must be in the question. Sufficient detail is provide in the question to guide formulating needed measures.

ThreadEx Coordinator	**Person responsible for conduct of this Thread during the experiment.** It may or may not be the Initiative Lead. Format Name; Email address (SIPR & NIPR); Land line number; Mobile number.
General Description	**General description of the events to occur so that thread data thread can be captured.** 1. What you are going to do? 2. What do you want to accomplish? 3. What do you expect to learn?

Date	**Dates during which you want data captured for this Thread.**
	    Experiment ThreadExs must be performed on a specific date(s) and time(s).
	    No free play!
	    The times can either be Local or Zulu as directed by the Experiment Director.
	THIS INFORMATION WILL BE USED TO POPULATE THE MEL.

Thread Frequency/Duration	**Times during the day for data capture** or the frequency during the day of data capture.

Operational Conditions	**What operating forces are to be doing so that the correct data is developed and captured**.
	    Operational Conditions reflect specific operational events that must occur.
	      e.g, ship relative movements, i.e., ships must be in specific relative positions and distances for the ThreadEx to be successful.
	      e.g., a White Cell event that injects operational information.

System Conditions	**Conditions at which any system need to be operating for correct data capture.**
Information Conditions	**Needed information conditions for correct data production.** e.g., formats, type of information to be available, informatin load, etc.

System Log Measures	**Specific measures to be determined from electronic system logs.**
	    System from which the log is to be obtained.
	    Format Attribute: System: measure description, second measure description;…
	      e.g., Timely: GCCS: elapsed time between information sent and received, elapsed time between information received and displayed.

Chat Log Measures	**Specific measures to be determined from Chat logs.**
	    Chat Room from which the log is to be obtained.
	    Format Attribute: Chat Room: measure description; second measure description;…
	      e.g., Reach: IRS Analysts: number of people using chat as a function of situation.
	        Efficiency: IRS: number of mouse clicks required to log on.

Observer Log Measures	**Specific measures to be determined from SME-Observer logged event information.** Logger who is to record the information.　　　Format　Attribute: Logger: measure description, second measure description;　　　e.g., Timely: UAV Observer: elapsed time between request for imagery and target obtained, elapsed time between target obtained and image chipped, elapsed time from image obtained and image sent.
SME Observer Questions	**Specific questions to be answered by an SME-Observer.** Specify the SME. Format　　Attribute: SME: question, second question;… 　　e.g., Timely: CIC Observer: Was information available in time for Commander's briefing? Sufficient: J3 Observer: Was their sufficient information to provide the needed situation assessment?
Survey Questions	**Specific questions to be answered by operator survey.** Specify operators to be surveyed. In most cases the SME and Operator questions will be the same. Format　　Attribute: personnel: question, second question…. 　　e.g., Timely: CIC personnel: Was information available in time for Commander's briefing? Sufficient: J3 analysts: Was there sufficient information to provide the needed situation assessment?
Participant Status	**Coordination prior to each event.** There must be coordination between the parties who are participating in the ThreadEx to determine their status PRIOR to starting the ThreadEx. The parties could be at a single location or on multiple platforms. The TC must contact all parties PRIOR to starting the ThreadEx to determine their status. How will this be done? Typically by email or chat. The response or format by each participant can vary but must be agreed upon PRIOR to the ThreadEx, i.e., "Go/No Go" by system(s) required to support the ThreadEx.
Instructions / Procedures	**Instructions for personnel so that they can help direct Thread activities.** What are you going to do step-by-step? 　　Step 1. Disconnect widget 1 from widget 2.　　Step 2.　　Step 3.
Data Collection Instructions	**Specific instructions for the ThreadEx data collector.** 1. What data should be collected? 　e.g., A survey will be performed, Observation Logs maintained, Electronic Logs captured from systems, etc. 2. Where will the data be collected and with what medium? 3. Who will collect the data? 4. When will the data be collected?
Reporting Instructions	**Instructions for all reporting to be done by experiment personnel.** 　daily,　　after action,　　quicklook,　　etc.
Event Review Comments	**Reviewer guidance for needed input modifications.** This review is for events and conditions. Choose the appropriate status drop-down after review or modifications.
Data Review Comments	**Reviewer guidance for needed input modifications.** This review is for data to be captured and participant directions. Choose the appropriate status drop-down after review or modifications.

Table 8. Directions for events and data planning input (ThreadEx).

9.3   Analysis Planning Directions

Analysis Planning Directions	
Thread #	Thread identifier using specified format.
Status	**Planning components status**. Choose status from the drop-down. Only Reviewer can choose Reviewed or Complete. **Reviewed =** review has been conducted and modifications are needed. **Modified** (Lead or SME use only) = modifications have been made in response to reviewer's comments and another review is needed.
System Log Measures	**Specific QUANTITATIVE measures to be determined from electronic system logs**. Specify the system log from which data will be obtained. Format "Attribute: System: measure description, second measure description;". e.g., Timely: GCCS: elapsed time between information sent and received, elapsed time between information received and displayed.
System Analysis Procedures	**Analysis procedures to be used to determine the measures from the system log data.** e.g., average, distribution plot, histogram, max and min, ratio, etc.
System Analysis Status	**Current system data analysis status.** Status Needed procedure changes Roadblocks.
System Analyst	**Name of the person responsible for performing system data analysis.**
Chat Log Measures	**Specific QUANTITATIVE measures to be determined from Chat logs**. Specify the Chat Room from which the log is to be obtained. Format "Attribute: Chat Room: measure description; second measure description; etc". e.g., Reach: IRS Analysts: number of people using chat as a function of situation. Efficiency: IRS: number of mouse clicks required to log on.
Chat Analysis Procedures	**Analysis procedures to be used to determine the measures from the Chat log information.** e.g., average, distribution plot, histogram, max and min, ratio, etc.
Chat Analysis Status	**Current Chat information analysis status.** Status Needed procedure changes Roadblocks.
Chat Analyst	**Name of the person responsible for performing chat log analysis.**
Observer Log Measures	**Specific QUANTITATIVE measures to be determined from SME-Observer logged event information.** Specify the logger who is to record the information. Format "Attribute: Logger: measure description, second measure description;". e.g., Timely: UAV Observer: elapsed time between request for imagery and target obtained, elapsed time between target obtained and image chipped, elapsed time from image obtained and image sent.
Obs. Measures Analysis Procedures	**Analysis procedures to be used to determine the measures from the Chat log information.** e.g., average, distribution plot, histogram, max and min, ratio, etc.
Obs. Measures Anal. Status	**Current observer measures analysis status.** Status Needed procedure changes Roadblocks.
Obs. Measures Analyst	**Name of the person responsible for performing observer log analysis.**
SME Observer Questions	**Specific questions to be answered by an SME-Observer (SUBJECTIVE)**. Specify the SME. Format "Attribute: SME: question, second question;". e.g., Timely: CIC Observer: Was information available in time for Commander's briefing? Sufficient: J3 Observer: Was there sufficient information to provide the needed situation assessment?
SME Questions Analysis Procedures	**Analysis procedures to be used to determine Attribute question results from the SME-Observer answers to questions.** e.g., scale, average over observers, etc.
SME Questions Anal. Status	**Current observer questions analysis status.** Status Needed procedure changes Roadblocks.
SME Questions Analyst	**Name of the person responsible for performing observer questions analysis.**

Survey Questions	**Specific questions to be answered by operator survey.**
	    Specify operators to be surveyed.
	    In most cases the SME and Operator questions will be the same.
	    Format Attribute: personnel: question, second question….
	        e.g., Timely: CIC personnel: Was information available in time for Commander's briefing?
	Sufficient: J3 analysts: Was there sufficient information to provide the needed situation assessment?

Survey Quest. Analysis Procedures	**Analysis procedures to be used to determine Attribute question results from operator answers to questions.** e.g., scale, average over observers, etc.
Survey Anal. Status	**Current operator questions analysis status.** Status Needed procedure changes Roadblocks.
Survey Analyst	**Name of the person responsible for performing observer questions analysis.**

Aggregation Procedures	Analysis procedures to be used to fuse various results.
	    E.g., Several measures into a single Attributes metric.
	        Objective and subjective into an Attribute result.
	        MOPs into an MOE.

Thread Context Procedures	**Procedures to be used to extract the context/situation under which this Thread's data were captured.**

Objective-Question	**Each Objective-Question contributes to achieving the Objective.**
	    There may be several Objective Questions for an Objective.
	    Only a single question is allowed for each Thread. If more than one question is needed, use multiple threads.
	    The attributes for the measures to be obtained must be in the question. Sufficient detail is provide in the question to guide formulating needed measures.

Objective-Question Analysis Procedure	**Analysis procedures to produce the Objective-Question answer.**
	    Yes/no answer only not acceptable, must contain explanation, including context.
	    e.g., Fusion of included Attribute measures/answers.
	        Weighting of the various contributing results.
	        Purely subjective from correlation of SME and operator opinions.

Obj.-Quest. Anal. Status	**Current Objective-Question analysis status.** Status Needed procedure changes Roadblocks.
Obj.-Quest. Analyst	**Name of the person responsible for performing objective-question analysis.**

Objective	**High-level statement of an operational or developmental purpose.**
	    Only a single sentence allowed.
	    All Objectives with the same Objective number must have the same statement.
	    Details of specifics to be determined go in the Objective-Question.
	    An Objective can have several Objective-Questions.

Objective Analysis Procedures	**Analysis procedures to produce the Objective status.**
	    e.g., Fusion of answers from included Objective-Questions.
	        Weighting of the various contributing results.
	        Purely subjective from operator opinions.

Objective Anal. Status	**Current Objective-Question analysis status.** Status Needed procedure changes Roadblocks.
Objective Analyst	**Name of the person responsible for performing objective-question analysis.**

Attrib. & Meas. Procedures Review	**Reviewer guidance for needed input modifications.**
	    This review is for attributes and measures analysis procedures.
	    Choose the appropriate status drop-down after review or modifications.

Obj.-Quest. & Obj. Proced. Review	**Reviewer guidance for needed input modifications.**
	    This review is for Objective and Objective-Question analysis procedures.
	    Choose the appropriate status drop-down after review or modifications.

Table 9. Directions for Analysis planning input.

9.4   Results Input Directions

Results Input Directions	
Thread #	Thread identifier using specified format.

Status	**Results components status**.
	    Choose status from the drop-down.
	    Only Reviewer can choose Reviewed or Complete.
	    Reviewed = review has been conducted and modifications are needed.
	    Modified (Lead or SME use only) = modifications have been made in response to reviewer's comments and another review is needed.

System Log Measures	**Specific QUANTITATIVE measures to be determined from electronic system logs**.
	    Specify the system log from which data will be obtained.
	    Format "Attribute: System: measure description, second measure description;".
	    e.g., Timely: GCCS: elapsed time between information sent and received, elapsed time between information received and displayed.

System Log Measures Values	**Numerical value of each prescribed measure from system logs.**
	    Follow the analysis plan for producing these measures.
	    Format Measure: Result.

Chat Log Measures	**Specific QUANTITATIVE measures to be determined from Chat logs**.
	    Specify the Chat Room from which the log is to be obtained.
	    Format "Attribute: Chat Room: measure description; second measure description; etc".
	    e.g., Reach: IRS Analysts: number of people using chat as a function of situation.
	        Efficiency: IRS: number of mouse clicks required to log on.

Chat Log Measures Values	**Numerical value of each prescribed measure from Chat logs.**
	    Follow the analysis plan for producing these measures.
	    Format Measure: Result.

Observer Log Measures	**Specific QUANTITATIVE measures to be determined from SME-Observer logged event information.**
	    Specify the logger who is to record the information.
	    Format "Attribute: Logger: measure description, second measure description;".
	    e.g., Timely: UAV Observer: elapsed time between request for imagery and target obtained, elapsed time between target obtained and image chipped, elapsed time from image obtained and image sent.

Observer Log Measures Values	**Numerical value of each prescribed measure from Observer logs.**
	    Follow the analysis plan for producing these measures.
	    Format Measure: Result.

SME Observer Questions	**Specific questions to be answered by an SME-Observer (SUBJECTIVE)**.
	    Specify the SME.
	    Format "Attribute: SME: question, second question;".
	    e.g., Timely: CIC Observer: Was information available in time for Commander's briefing? Sufficient: J3 Observer: Was there sufficient information to provide the needed situation assessment?

SME Observer Answers	**Analysis processed answers to each of the SME answered questions.**
	    Follow the analysis plan for this information.
	    Include individual answers and summaries as needed for full understanding of the results.
	    Provide a result for each Attribute.

Survey Questions	**Specific questions to be answered by operator survey.**
	    Specify operators to be surveyed.
	    In most cases the SME and Operator questions will be the same.
	    Format Attribute: personnel: question, second question….
	        e.g., Timely: CIC personnel: Was information available in time for Commander's briefing? Sufficient: J3 analysts: Was there sufficient information to provide the needed situation assessment?

Survey Answers	**Analysis processed answers to each of the SME answered questions.** 　Follow the analysis plan for this information. 　Include individual answers and summaries as needed for full understanding of the results. 　Provide a result for each Attribute.
Thread Context	**Pertinent context/situation under which data and information for this Thread were gathered.** Include any context that influences the results. 　e.g., system malfunction, needed information absent, personnel untrained, etc.
Objective-Question	**Each Objective-Question contributes to achieving the Objective**. 　There may be several Objective Questions for an Objective. 　Only a single question is allowed for each Thread. If more than one question is needed, use multiple threads. 　The attributes for the measures to be obtained must be in the question. Sufficient detail is provide in the question to guide formulating needed measures.
Objective-Question Answer	**Statement answer to the Objective-Question**. 　Not yes/no,　and any desired elaboration. 　Some elaboration will be contained in the below Context Impact.
Context Impact	**Impact of context/situation on the results** 　e.g., validity, Applicatility limitations, need for further study, etc.
Measures Results Review	**Reviewer guidance for needed input modifications.** 　This review is for measures and question answers. 　Choose the appropriate status drop-down after review or modifications.
Objective-Question and Context Results Review	**Reviewer guidance for needed input modifications.** 　This review is for Context, Objective-Question results, and Objective results. 　Choose the appropriate status drop-down after review or modifications.

Table 10. Directions for results input.

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10. Example Experiment Thread

This planning example presents (in brief) the full holistic thought process that leads to specific experiment components.

Planning components are not presented for Analysis.

Overarching purpose
Operational activity supported - Re-Tasking of an en-route strike aircraft. Thus

> Objective: **Provide and distribute information for dynamic re-tasking of en-route strike aircraft.**

General planning considerations
The system RT-101 has been developed and is to be tested. The system is to provide information to both AOC/MOC decision-makers and to the aircraft. The overarching purpose of the test is to determine if the system:
- Supports decision-making by ground units.
- Provides both tasking and targeting information in the aircraft that allow the mission to be prosecuted successfully.
- Supports TST re-tasking timelines.

Thread (or multi-Thread) formulation considerations:
What is to be learned:
- Whether the aircraft information presentation supports target engagement.
- Whether the information supports TST timelines.
- Whether existing comms are sufficient to support the system.

The associated Objective-Questions are:
Thread-1   **Is RT-101 capable of providing sufficient, accurate, and clear targeting information to aircraft for TST engagement?**

Thread-2   **Does RT-101 provide timely TST information for re-tasking decision-making by the AOC and WOC and prosecution by aircraft in flight?**

Thread-3   **What bandwidth is required to support RT-101?**

Attributes
Thread-1 has an MOE (capable) and three MOPs so a roll-up could be required. The roll-up is too hard so capable will be asked as a subjective question. The other threads have only MOPs.
Thread-1   **Capable, Sufficient, Accurate, Clear**
Thread-2   **Timely**
Thread-3   **Capacity**

Measures
Thread-1   **Accurate: RT-101 display capture: TLE on display (m);**

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	Sufficient: RT-101 display capture: ratio of number missing to number of required elements, number of required elements unclear.
Thread-2	**Timely: RT-101 log: time lapse (min) for – receipt of TST information at AOC - sending prosecution request to WOC – re-tasking sent to aircraft – re-tasking receipt at aircraft – aircraft response to request – target engagement.**

Thread-3	**Capacity: link sniffer: RT-101 bandwidth usage.**

Questions

Thread-1	**Capable: AOC observer: WOC operator: Pilot: Is RT-101 capable of supporting TST re-tasking? Sufficient: AOC Observer: WOC operator: Is RT-101 information sufficient for making re-tasking decisions? Accurate: Pilot: Is RT-101 information accurate enough to engage the target? Clear: Pilot: Is RT-101 display clear for target engagement?**

Thread-2	**None**
Thread-3	**None**

Type of test

- Live test, aircraft in flight.
- Both AOC COD/DOT and Wing engaged in the re-tasking decision.
- Tipper injected by the White Cell, no live ISR.
- Target information pre-formulated and input to system, by system operator, when tipper received.

Conditions (for all 3 Threads)

Operational:	**Strike aircraft in flight, WOC decision unit functioning, AOC decision unit functioning.**

System:	**RT-101 in operation at each node**. **Standard comms links.**

Information:	**Full information on target, including imagery, injected not retrieved from MIDB. Assume mensuration not needed. Injected ATO of sufficient detail (Wing assignments) to make aircraft re-tasking decision. WOC inject of aircraft assignments and load-out. CDE not needed.**

ThreadEx Procedures:

Aircraft assigned strike mission through ATO. TST information forwarded from White Cell to RT101 operator. Operator injects TST information. SME observers on station at WOC and AOC to capture information events on RT-101.

Data Collection Instructions:

SME observers download RT-101 logs at the end of each re-tasking

mission. SME observers direct pilot and AOC and WOC operators to take survey at the end of each re-tasking mission. SME observer file event log at the end of each experiment day.

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