I-X Process Panels – User's Guide

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CONTENTS

How to Use This Guide

This document is intended to provide a simple manual for using I-X Process Panels.

Section 1 provides an introduction to the I-X process panel and supporting panels together with instructions of how to run these panels. This section also provides pointers to simple demonstrators of process panels as well as a **quick-start guide** for those eager to try the I-X tools quickly. **Section 2** describes the use of I-X Process Panels. **Section 3** describes the context of I-X process panels and its individual supporting tools.

For more details, see also the **I-X Web Pages** at www.i-x.info that contain overviews, introductions, and pointers to further documents and sources of information, including the following:

- The **I-X Demonstrators, e.g.** I-Demo-Basic and I-Demo-Cooperation;
- **I-X Domain Editor Guide** on how to use the I-DE tool;
- **I-X Configurer's Guide** on methods for building I-X applications. This guide describes the steps necessary to move beyond a basic use of the I-X tools by tailoring them for particular applications;
- **I-X Notes** with details on a variety of issues; and
- The **Javadoc**-generated documentation of the I-X system.

In future, we expect to also provide

- I-X Developer's Guide on how to further adapt I-X to specific requirements.
- I-X Modeller's Guide on how to produce high-quality domain models that are suitable for I-X applications.

1 Introducing I-X Process Panels (I-P^2)

An I-X Process Panel (I-P^2) is designed to act as a workflow, reporting and messaging 'catch all' tool for its user. It can act in conjunction with other panels for other users if desired. An I-X process panel therefore

- Can take ANY requirement to:
  - Handle an issue;
  - Perform an activity;
  - Maintain a constraint; and
  - Note an annotation.
- Deals with these above functions via:
  - Manual (user) activity through its GUI;
  - Internal capabilities through I-X and other compatible tools;
  - External capabilities (*invoke* or *query*) through I-X and other compatible tools;
  - Reroute or delegate to other panels or agents (e.g. using its *escalate*, *pass* or *delegate* messaging functions); and
  - Plan and execute a composite of these capabilities (e.g. through the *expand* capabilities of I-X).
- Receives and sends reports and messages, and, where possible, interprets them to:
  - Understand the current status of issues, activities, constraints and annotations;
  - Understand the current world state, especially the status of process products (i.e. outputs generated by the process in the panel); and
  - Help control the current situation (through communication, follow-up and execution of appropriate processes).
- Copes with partial knowledge (by making use of whatever knowledge is available).

Three example I-X panels are shown in the Figure 1, 2 and 3. These panels are taken from a demonstration of agent systems within a military Coalition context that is a part of the Coalition Agents eXperiment, the CoAX project (Allsopp et al. 2001; 2002).

An I-X Process Panel supports a user and their collaborators in selecting and carrying out *processes* and creating and modifying *process products*. Both processes and process products are abstractly considered to be made up of *Nodes* (i.e. a node may be an activity in a process, or a component of a process product). A node may contain sub-nodes. They can therefore be described using a hierarchical structure. These nodes may be restricted by their own local *Constraints*; and may relate to each other via a set of shared constraints of various kinds. An *Issue* may be associated with processes or process products to represent unsatisfied requirements, problems raised during analysing, critiquing or process execution.

Processes and process products in I-X are defined in the conceptual framework of <I-N-C-A> (i.e. the Issues – Nodes – Constraints – Annotations) model that is used to describe the activities, considerations and progression of synthesising artefacts (Tate, 2000; 2003).

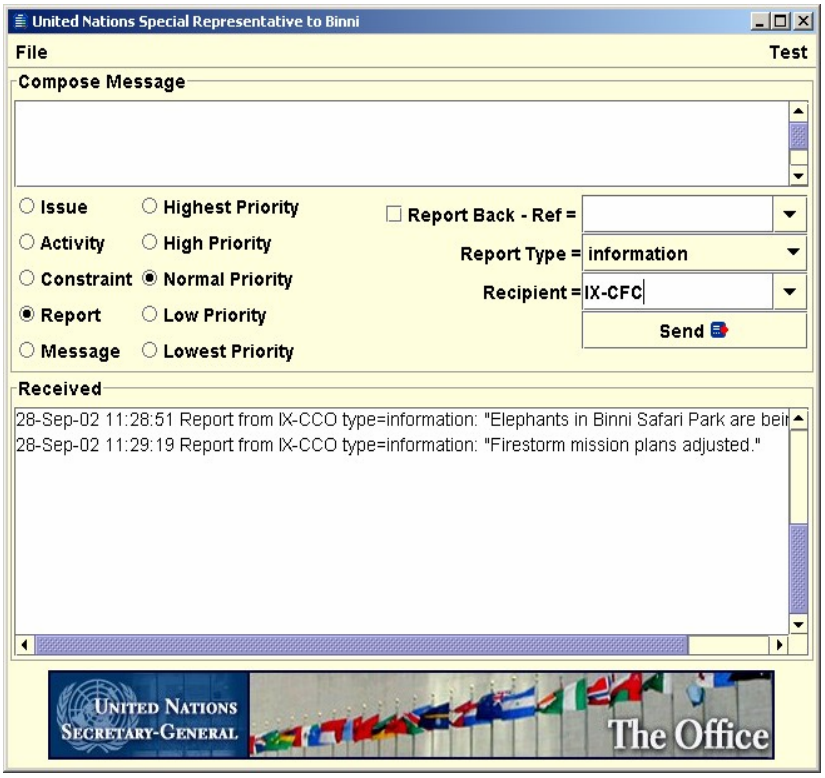

Figure 1: Screen Capture of the Messenger Tool of I-X

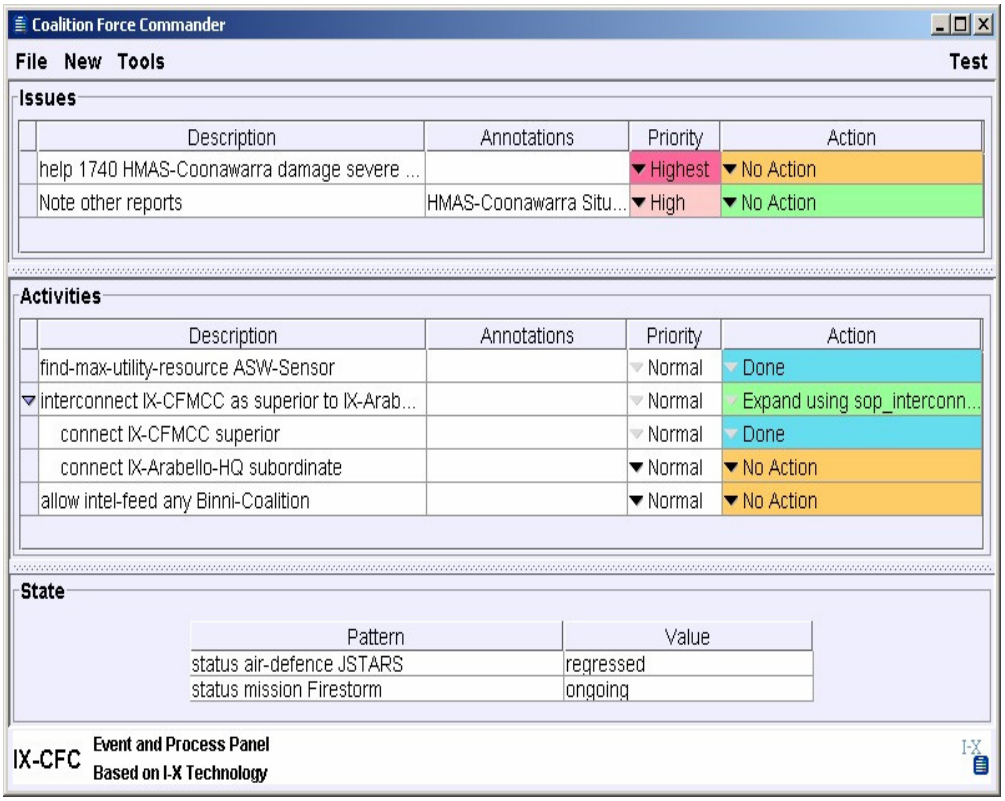

Figure 2: Screen Capture of I-X Process Panel for Coalition Force Commander

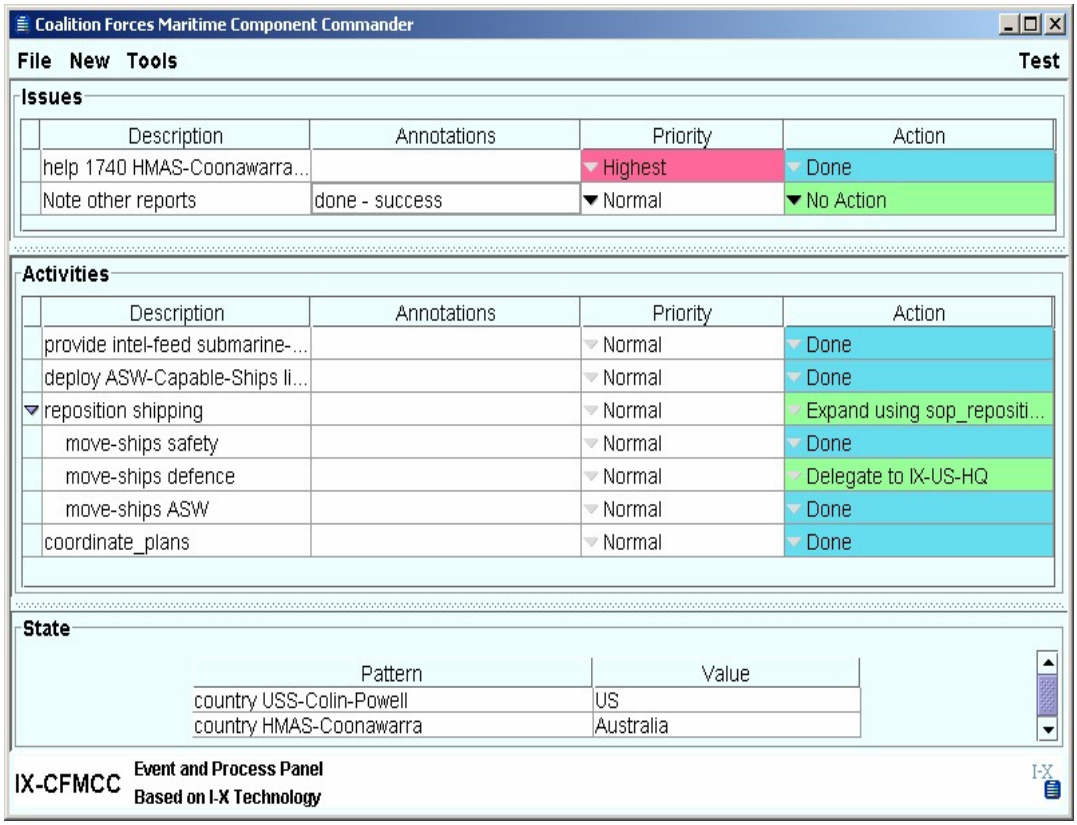

Figure 3: Screen Capture of I-X Process Panel for Maritime Component Commander

1.1 Running an I-X Process Panel

You can run a stand-alone I-X process panel or several panels that communicate with each other. The I-X Demonstrators illustrate the use of such panels. The quick start guide below explains how to run an empty, stand-alone process panel (for a quick look). Section 1.1.3 describes how to run a process panel with an existing Jabber account.

1.1.1 I-X Demonstrators

As a part of standard I-X distribution, there are a few demonstrators of simple I-X process panel applications that show how process panels may be used:

- **I-Demo-Basic**, described in <ix-base>/doc/IX-IDemo-Basic.pdf, gives a first look and provides instructions on how to use a process panel;
- **I-Demo-Cooperation**, described in <ix-base>/doc/IX-IDemo-Coop.pdf, illustrates the use of process panels for communication purposes.

Follow the instructions in the corresponding documents for those demonstrators and see I-X Process Panels in action.

1.1.2 A Quick Start Guide

The quickest way to start up and run an I-X Process Panel is to double-click on the I-X Jar file, <ix-base>/ix.jar. This will invoke a panel in stand-alone mode. Of course, in order to take the full advantage of I-X as a collaborative environment, you will eventually want to communicate with other panels. For this, see I-Demo-Cooperation or the next sub-section.

After you have double-clicked on the I-X Jar file, a window will come up to allow you to adapt the panel. All fields should already be filled with the defaults to bring up a simple panel, so just click “Ok”. This should start a basic I-X Process Panel.

You are now ready to explore the different I-X facilities:

- From the “New” menu you can create new issues, activities, constraints and annotations, and see these displayed on the panel (and once you’ve created a plan, save this through the “File” menu).
- From the “Tools” menu you can start a **Domain Editor**, and try creating your own process models. You can start a simple **HTML Viewer** for accessing directly local I-X HTML resources. You can use the **I-Space** tool to enter the names of other agents and your relationships with them (and see how this affects your options for handling the issues and activities on the main process panel). If you are logged on to a Jabber server and you know the Jabber Identification (JID) of another online user (who may be running a conventional Jabber client, rather than an I-X panel) you can try communicating with them using the **Messenger** tool by typing their JID into the “Recipient” field. Add some text to the “Compose Message” field, and clicking “Send”. If you do not know any other online users, you can still test your connection by sending a message to `ix-test@jabber.org` - this is an agent that simply responds with an acknowledgment for any message it receives.
- The options in the “Help” menu provide more information about using I-X.

This way, soon you’ll learn more about I-X and how to tailor it to your own applications.

1.1.3 Jabber Start Guide

This section describes how to run an I-X Process Panel using the *Jabber* instant messaging protocol for communicating with other users’ panels. To run a Jabber process panel:

1. Double-click the `ix.exe` icon (MS Windows users); or the `IX-Mac` icon (Apple Mac users); or from a command-line prompt, call the `ix` application script (Unix, Linux and Mac OS X users). This should start a basic I-X Process Panel.

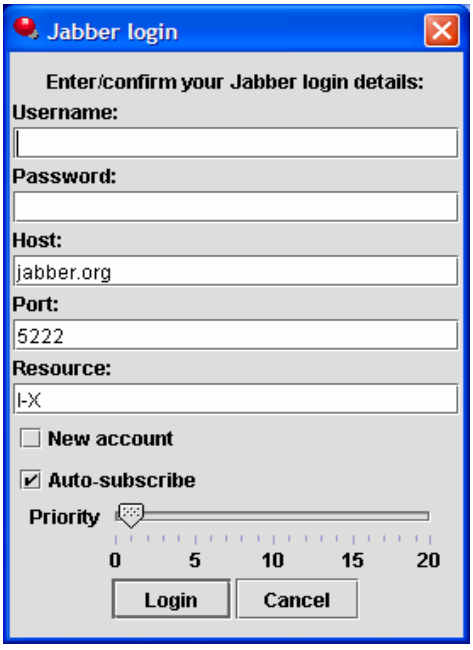

Figure 4: Jabber Login Screen

2. Along with the panel, a “Jabber login” window should now appear (pictured below):
   - If you wish to simply run a stand-alone panel, you should click “Cancel”.
   - If, on the other hand, you want to communicate with other I-X panels *and you already have a valid Jabber username and password*, you should enter these details, along with the name of the Jabber server on which this name is

registered, and then click on “Login”. If successful, the name of your panel should be updated to show your username.

- Finally, if you want to communicate *but do not have a username*, then you can attempt to create a new account through this window. To do this, you need to type in the name of a Jabber server that allows new accounts to be created (`jabber.org`, for example) and enter a new username and password (taking care to remember your choices!) and tick the “New account” box. Now click on “Login”: if the new account has been successfully created, the name of your panel should now be updated with your new username. However, if the attempt fails (perhaps because the username you chose is already in use), you will see an error message, and will be prompted to try different values. (To learn more about Jabber Instant Messaging see `http://www.jabber.org/`.)

3. Explore the different I-X facilities as for the quick start in the previous sub-section.

2 Using an I-X Process Panel

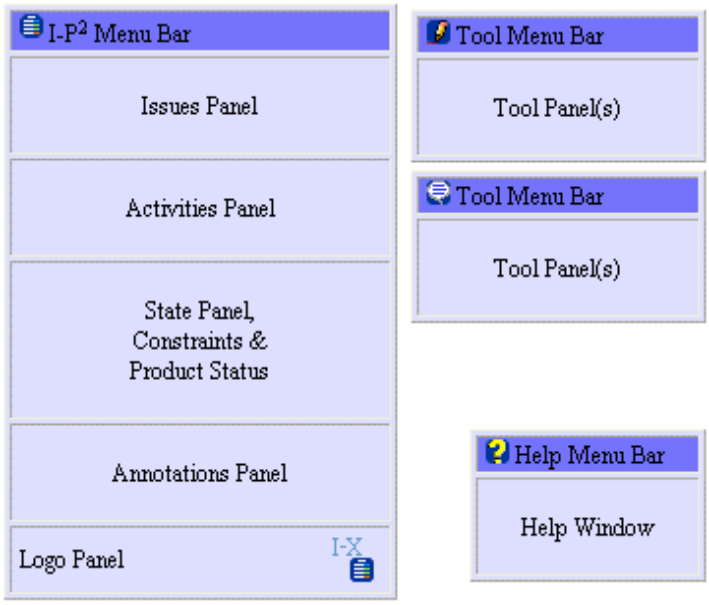

Figure 5: Schematic Design of I-X Panels

An I-X Process Panel (I-P^2) (shown schematically above) contains a number of sub-panels that describe:

- A set of issues to be handled.
- A set of activities to be performed.
- Current state information reflecting the current set of constraints to be respected. This includes the status of a range of process products being created or manipulated by the processes.
- Annotations in the form of `keyword=value` pairs.

The panel supports its user in handling issues, deciding on a course of action performing activities, maintaining awareness of the current execution state, constraints, process products, etc., and making annotations of various kinds.

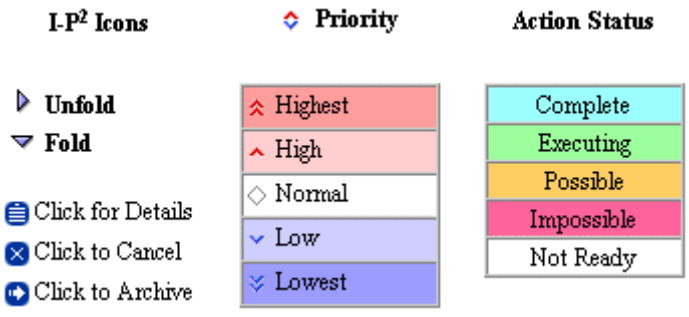

Figure 6: Entries and Colour Codes of I-X Menus

Entries on panels can be expanded using information stored in the process library that is retrievable through the Process Panel. These entries may also be passed between panels, e.g. through I-X's delegation and escalation facilities.

Right click on an entry to get a context-sensitive menu that describes operations you can perform on it. Where relevant, this includes the ability to pop-up a window with more details of the entry, or to expand or contract the display of some levels of hierarchically specified activities, to send information about the entry to the Messenger tool for sending on to others (perhaps in a modified form), etc.

3 Context and Tools for I-X Process Panels

A *Tools* menu is available to make accessible the following facilities:

- A domain or process library editor to view, edit or add to the list of process descriptions which may be used to 'expand' process entries on the process panel (*I-DE*, see section 3.1.2).
- A tool to view and change the relationships of the current panel to others (*I-Space*, see section 3.2).
- An instant messaging or 'chat' tool to communicate in free format or the encouraged <I-N-C-A> structured forms with other I-X Process Panels and other systems ("intelligent messaging" or "semantically augmented messaging": *Messenger*, see section 3.3).
- Other tools can be added to I-P^2, for example, the Map Tool that enables representative domain objects to be displayed and manipulated in a geographical space, as the application demands.
- In addition, an AI planner is available to automatically construct alternative ways of performing current activities and achieving objectives (*I-Plan*, see section 3.4).

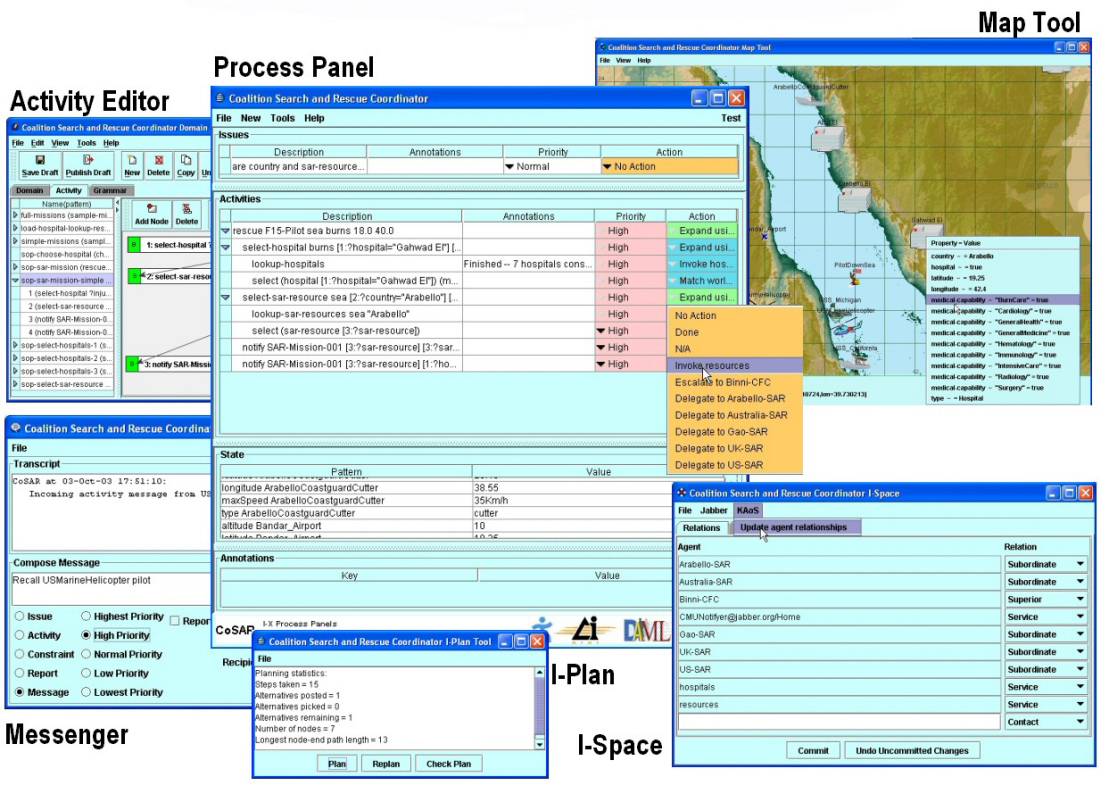

Figure 7: A combined use of tools in an I-X Application

3.1 Editing Domains

The process model descriptions used by I-X Process Panels are kept in *domain libraries*. These can be loaded when a panel is started, and can be augmented dynamically by the user of the panel. There are two editing tools available to I-X users to help them create and manage their own domains: the *Simple Editor* and the *I-X Domain Editor* (*I-DE*). These are introduced below. The current editor can be invoked from a Process Panel by selecting *Tools > Domain Editor*.

3.1.1 Basic Editing: A *Simple* Domain Editor

The process panels contain a simple, form-based domain and process editor (shown above). This allows simple task breakdowns to be specified along with a temporal constraint that the sub-steps should be either sequentially ordered or performed in parallel.

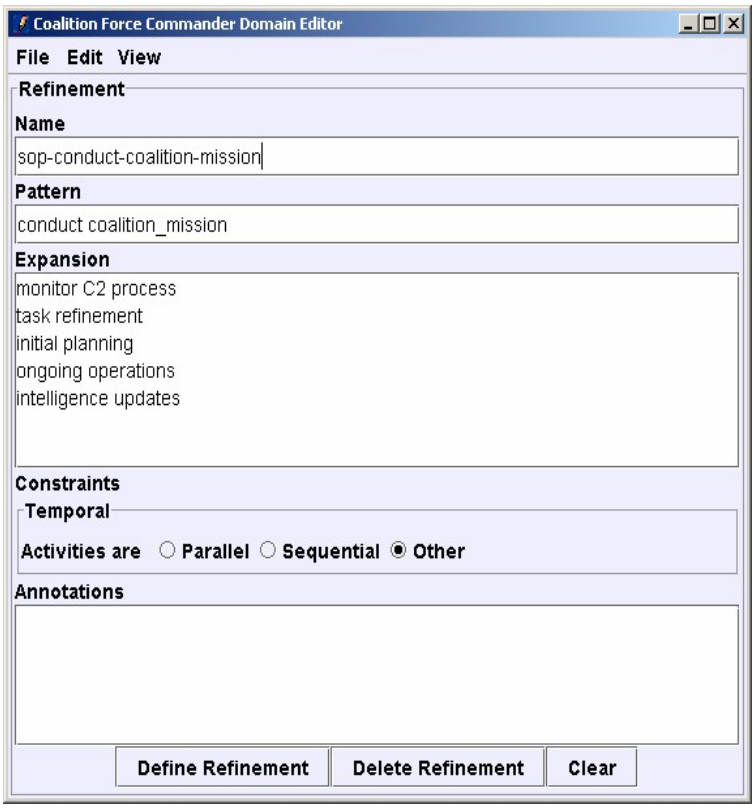

Figure 8: The Simple Domain Editor

3.1.2 A More Sophisticated Editor: *I-DE*

To create richer descriptions of process models and allow more sophisticated management of domain libraries, the user of I-X may want to use I-DE. I-DE is a more powerful domain and process editor that it offers multiple perspectives and views onto a model. In addition to editing process models, I-DE can also be used to model other aspects of the domain, such as object classes. It also provides different styles of visualisation of the models. Appendix A describes how it can be replaced by the Simple Editor for applications where adequate. I-DE is also available as a stand-alone application for the maintenance of domain and process libraries.)

3.1.3 Using XML and Text Editors

There is a further option for users without access to either the Simple Editor or I-DE, or those who wish to make simple amendments to their models. The fact that the domain models created by these tools are saved in XML files means that they may be modified using an XML editor, e.g. Microsoft's XML Notepad, or a standard text editor. Example screen captures of these tools are provided in Figure 10 and 11. For more information on XML Notepad, see http://msdn.microsoft.com/xml/notepad/intro.asp.

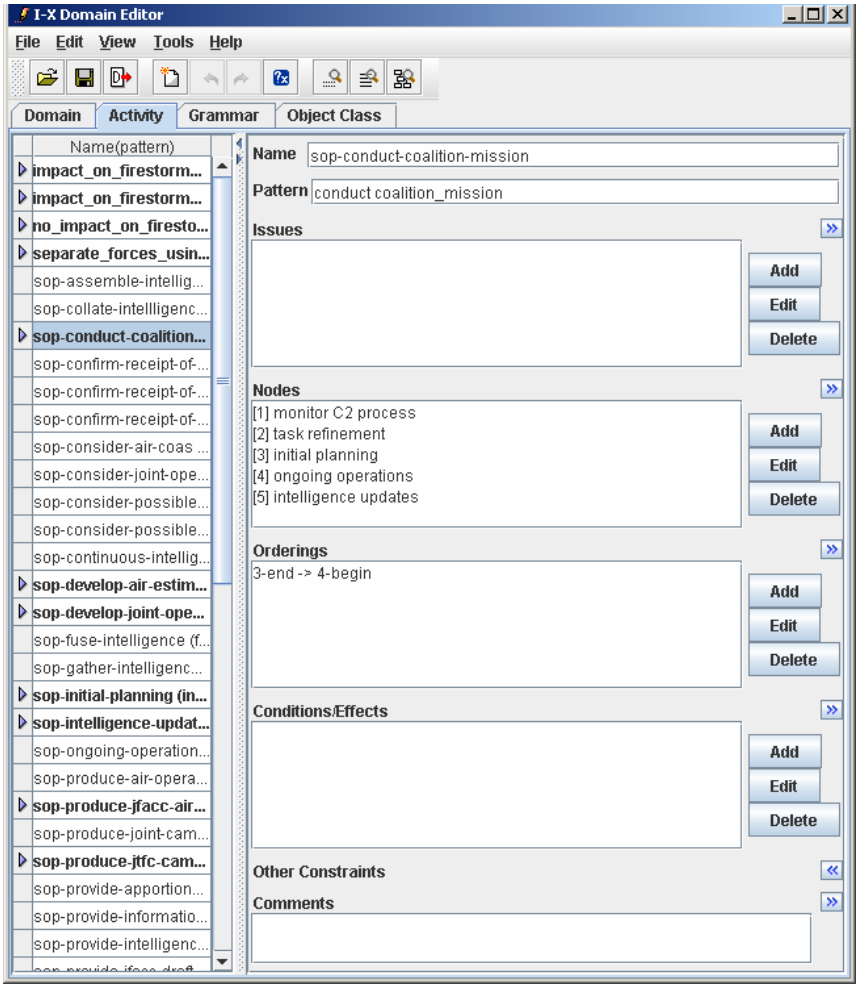

Figure 9: I-DE, An Advanced Domain Editor

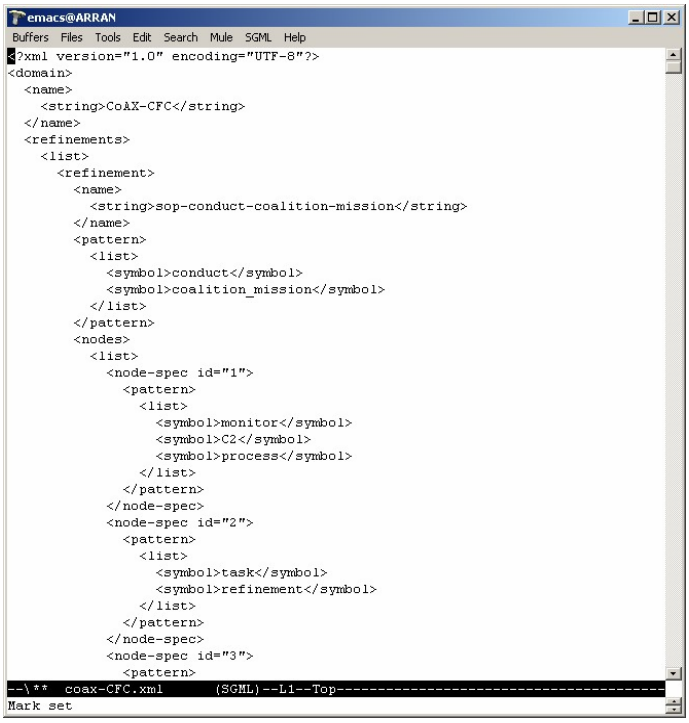

Figure 10: Using a standard text editor for an XML Document

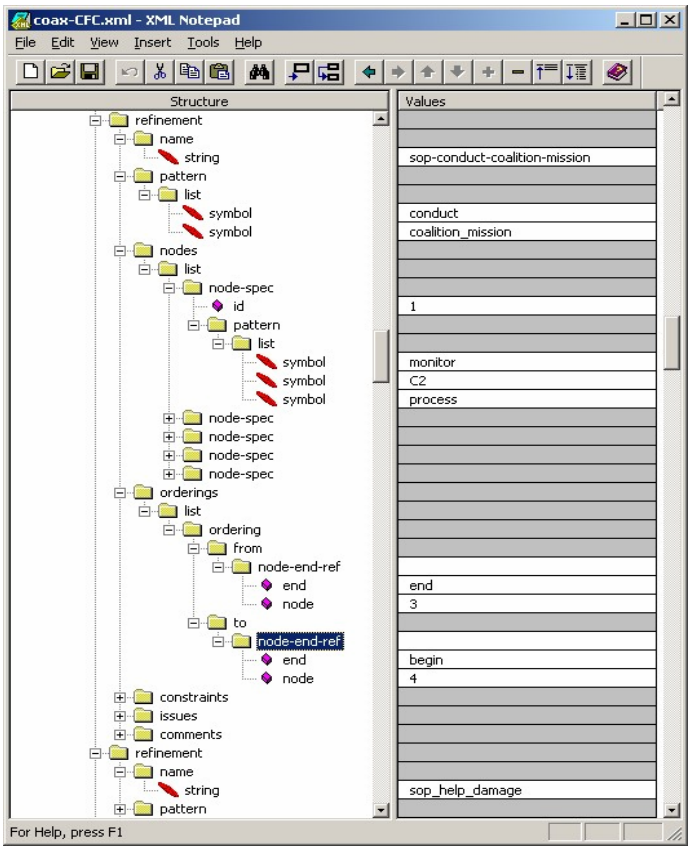

Figure 11: A Screen Capture of XML Notepad

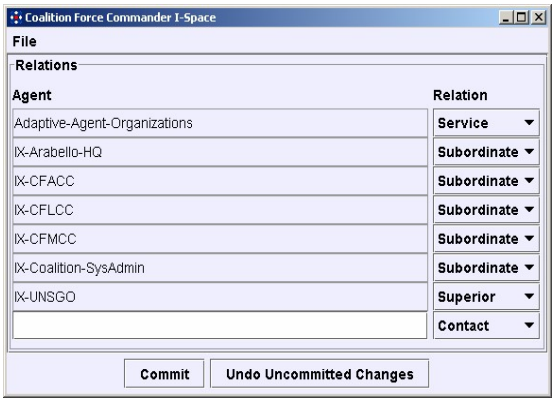

Figure 12: The I-Space Tool

3.2 The I-Space Tool

The I-Space tool allows for the management of the organisational relationships between the current panel (referred to as “me”) and other panels, agents and external services. New agent names can be typed into the text field at the bottom. Existing agents or panels can have their relationships altered. The *Commit* button is used to inform the process panel of any addition or changes to the set of relationships with existing entries. You can undo any changes made to the I-Space table that have not been committed already.

The relationships defined affect *Action* menu items for issues and activities of the corresponding Process Panel. It also determines how issues and actions may be passed around, e.g. through escalation or delegation. The relationships and the corresponding *Action* menu items are as follows:

Table 1: Action Menus in the Process Panel in relation to organisational relationships specified in the I-Space Tool

Relationship	*Action* Menu Item
Superior	Escalate to (with report back)
Peer	Pass to (with report back)
Subordinate	Delegate to (with report back)
Service	Invoke (with report back)
Contact	None
None	None

Providing a description of the verbs associated with any agent (via the *Capabilities* tab) can be used to selectively show the agent in the Action menu only for the specified verbs. If no verb association is provided, it is assumed that all Superiors, Peers and Subordinates can handle any item (i.e., described using any verb). It is expected that an external-capabilities description is given for a Service or it will not appear on the menu at all.

For some communications strategies, extra menu options are added into the I-Space tool to provide services and facilities relevant to the specific nature of the communications strategies in use.

3.3 The I-X Messenger Tool

The I-X Messenger tool is used to compose and send messages to other panels and agents. Messages can be designated issues, activities (these with corresponding priorities) or constraints, or, less formally, simple 'chat' messages. The tool also shows any chat messages received from other agents (in the Transcript window). You can send messages to your own panel ("me") and there is also a simple group sending facility (which will be expanded in future releases).

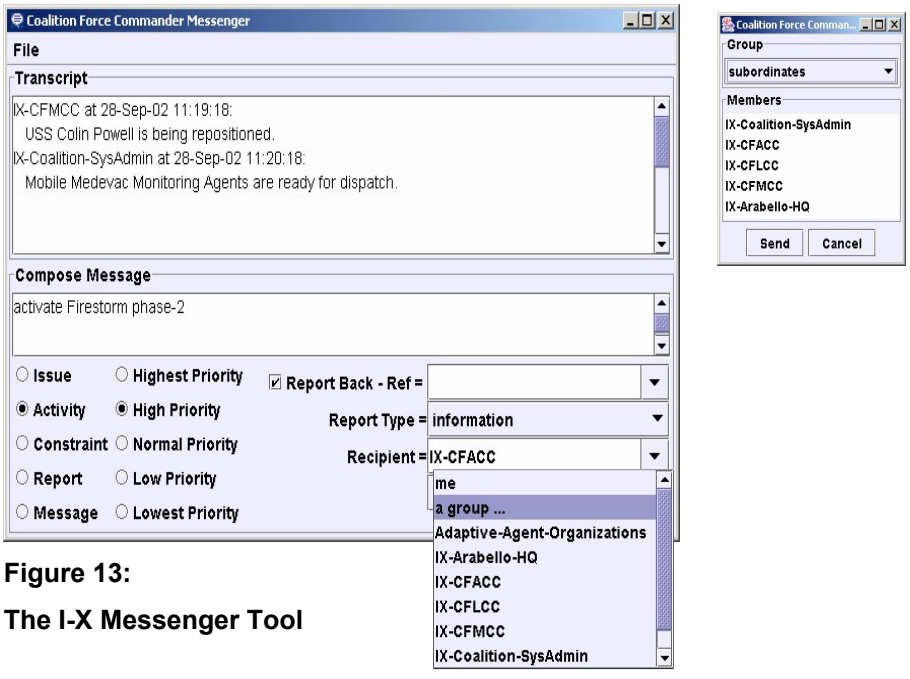

Figure 13:

The I-X Messenger Tool

3.4 The I-Plan Tool

The facilities available in the I-X Process Panels provide context sensitive options for the handling of issues (such as the achievement of stated objectives), the performance of activities, and the satisfaction of constraints. A simple AI Planner (I-Plan) is available as a tool to propose alternative ways in which activities on the panel can be expanded.

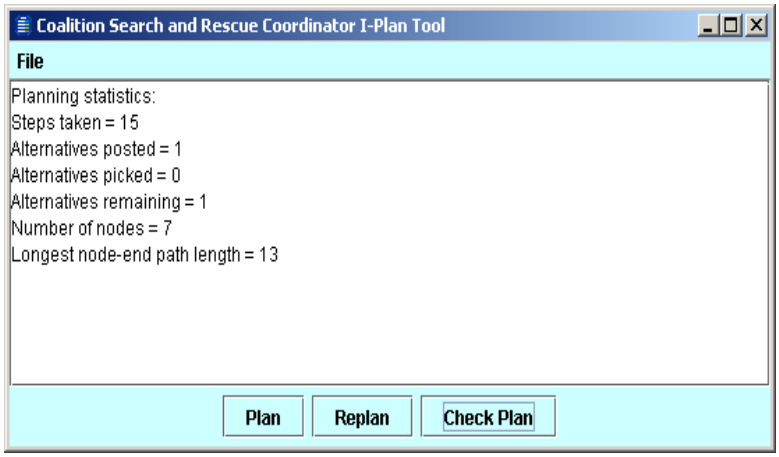

Figure 14: The I-Plan Tool

I-Plan can perform hierarchical partial-order composition of plans from a library of plan schemas or Standard Operating Procedures (SOP). This library can be augmented during planning either using a simple 'activity details' interface to add in specific ways to expand a given activity (intended for users familiar with the application domain but not AI planning techniques) or with a more comprehensive graphical domain editor (I-DE – see section 3.1.2). Grammars and lexicons for the activities in the domain and the objects manipulated by them are built automatically during domain editing to assist the user.

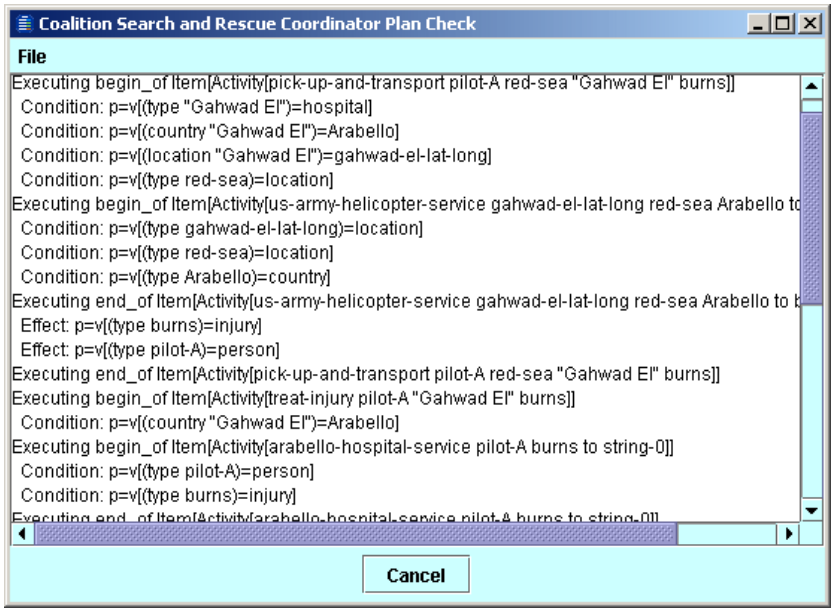

Figure 15: Plan generation using the I-Plan Tool

I-Plan can check that (pre-)conditions are satisfied or introduce activities to achieve them, it can select consistent bindings for a set of variables in the current plan, and can check or

impose temporal constraints between activities. I-Plan cannot currently reason about resources, spatial constraints, or metric time constraints.

Future developments of I-Plan will provide more assistance with a ‘How do I do this?’ option under the *Action* menu which will be able to account for other concurrent items on the panel, and account for mutual satisfaction of open variables, unsatisfied world state conditions and other constraints. I-Plan will also be extended to provide a plan repair capability should activities fail during execution, or the environment dynamically change in unforeseen ways.

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