Chapter 1
An Argumentation Model of Deliberative Decision-Making

Douglas Walton
University of Windsor, Canada

ABSTRACT
This chapter presents deliberation dialogue as a framework for argumentation used in group decision-making. Drawing on and summarizing the previous literature in argumentation and artificial intelligence (AI), the chapter: (1) outlines the characteristics of deliberation as a type of dialogue; (2) distinguishes between deliberation dialogue and other types of dialogue it is closely related to and often confused with; (3) refines the existing models of deliberation to make them more useful for supporting reasoning communities engaged in collaborative decision making; (4) provides a worked example to show what the stages and characteristics of a deliberation dialogue are, and show how methods from AI and argumentation can be applied to analyzing it; and (5) outlines some further areas for research on deliberation that are currently being studied.

INTRODUCTION
Argumentation has been mainly concerned with finding or assessing reasons to prove a statement is true or false, but recently there has been some attention paid to the kind of arguments used in deliberative decision-making. Van Gelder (2009, p. 5) contrasts intuitive decision-making, where decisions are made on the basis of what seems right without any systematic review of options, with technical decision-making, where qualitative argumentation is replaced by calculation. He argues (2009, p. 6) that although many important decisions go wrong, deliberative decision-making cannot be replaced by either intuitive or technical decision-making. The aim of this paper is to apply some tools recently developed in argumentation, like argument mapping, that show promise of being helpful to improve both intuitive and technical deliberative decision-making.

The traditional technical method of decision-making weighs the expected costs of a set of alter-
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native course of action costs against its expected benefits, and decides the outcome by selecting the alternative with the greatest expected utility. In this chapter, an alternative is proposed called the argumentation approach. This new approach uses argumentation schemes, defeasible forms of reasoning representing common kinds of arguments, and applies these schemes within contextual frameworks called dialogues, in which both sides (pro and contra) of an argument are taken into account (Bench-Capon & Dunne, 2007). One type of dialogue, called deliberation, is shown to be especially important in this regard, and one scheme, called practical reasoning (Searle, 2001; Bench-Capon, 2003) is chosen to show how the approach works.

This chapter presents an argumentation method of deliberative decision-making that compares the arguments on both sides, using argumentation schemes to identify their premises and conclusions and to find missing assumptions. As critical questions are raised, as new information comes in, and as counter-arguments are put forward, reasons for a proposal can be supported or undercut. The argumentation approach is to construct an argument map that represents the chained argumentation on each side, and shows how arguments support or attack a proposal. A worked example that illustrates this methodology is included. Drawing on and summarizing the previous literature in argumentation and artificial intelligence, this chapter outlines the characteristics of deliberation as a type of dialogue, and refines existing models of deliberation.

Section 1 provides an example of deliberation that is extensive enough that every reader can see how it represents a common kind of decision-making that we are all familiar with on a daily basis. The argumentation in the example is also extensive enough that there is not enough space to analyze all the arguments in it. However, the goal of the chapter is not to provide a complete analysis or evaluation of the argumentation in the example, but only to illustrate some argumentation tools to the reader and give a general idea of how these tools can be applied to realistic cases of deliberative decision-making. The hope is to convince the reader that the argumentation approach has some advantages over intuitive methods and some technical methods when used alone.

BACKGROUND

Alice and Bob have moved from Edmonton to Windsor, and their real estate agent, Carol, has been showing them houses. They are under some pressure to make a decision within two months, as their furniture is then to be shipped from their previous house, and moving this amount of furniture to a storage unit, and then moving again to their new home, is a costly procedure. Their agent has provided them with a lot of information, and they have been looking through housing ads, and collecting as much information as they can about the housing situation in Windsor at the present time. Now they have narrowed the choice down to three homes, each of which would be suitable. The first is a condominium listed at $200,000. The second is a two-story house listed at $340,000. The third is a bungalow listed at $270,000. Another option is to select none of the three and keep searching, but they hope to avoid the potentially costly consequences of this action.

Before they sit down to discuss which one they should choose, they began by discussing general goals and values that are important to them in making this kind of decision. Both agree that having a quiet atmosphere is an important goal, and both agree that not being too far from the downtown area where Bob works is a goal. These goals could, of course, conflict in some instances, since there tends to be more traffic and noise in the downtown area. Costs are always important in such a large investment, and they agree that they want to buy a house that will keep its value, and to avoid buying a house that will lose value, for example because it is over-valued...
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