This paper describes a rule-based legal decisionmaking system (LDS) that embodies the skills and knowledge of an expert in product liability law. The system is being used to study the effect of changes in legal doctrine on settlement strategies and practices. LDS is implemented in ROSIE, a rule-oriented language designed to facilitate the development of large expert systems. The ROSIE language is briefly described and our approach to modeling legal expertise using a prototype version of LDS is presented.

I. INTRODUCTION

We are currently engaged in designing and building rule-based models of legal expertise. A rule-based model of expertise is a computer program organized as a collection of antecedent-consequent rules [1] that embodies the skills and knowledge of an expert in some domain. The primary goal of our work is to develop rule-based models of the decisionmaking processes of attorneys and claims adjusters involved in product liability litigation. We will use these models to study the effect of changes in legal doctrine on settlement strategies and practices.

Some progress has already been made in developing computer systems to perform legal analysis. The LEGOL Project [2] has been working for a number of years on the construction of a language for expressing legislation. In addition, systems have been developed for analyzing cases on the basis of legal doctrine [3,4], investigating the tax consequences of corporate transactions [5], automating the assembly of form legal documents [6], and performing knowledge-based legal information retrieval [7].

Our legal decisionmaking system (LDS) is being implemented in ROSIE, a rule-oriented language designed to facilitate the development of large expert systems. In section II the ROSIE language is briefly described. Section III discusses our approach to modeling legal expertise and describes the operation of our prototype version of LDS. The conclusions are presented in section IV.
IF: (the plaintiff is injured
or the plaintiff is the representative of
the plaintiff's decedent
and the incidental-sale defense is not an
applicable defense for the defendant
and (the product is manufactured by the
defendant
or the product is sold by the defendant
or the product is leased by the defendant
and (the product is a cause of injury to the
plaintiff
or the product is a cause of death to the
decedent
or the product is a cause of damage to the
plaintiff's property)
and the defendant is responsible for the use
of the product
and (the jurisdiction of the case is Calif.
or the plaintiff is a user of the product
or the plaintiff is a purchaser of the
product)
and the product is defective at the time of
the sale
and (the degree of the product's danger
to the plaintiff is unreasonable
or the degree of the product's danger
to the plaintiff's property is unreasonable)
or the jurisdiction of the case is Calif.
and the expected-change of the product at the
time of the sale to the consumer is
not substantial

THEN: assert the defendant is liable under
the theory of strict-liability.

FIGURE 1. Definition of Strict Liability in ROSIE

III. LEGAL MODEL

The model of legal decisionmaking we are
building will contain five basic types of rules:
those based on formal doctrine, informal princi-
pies, subjective considerations and
decisionmaking. We are examining the effects of changes in legal doctrine,
procedures and strategies on the processing of
cases by modifying appropriate rules in the model
and noting the effect on the operation of the model
when applied to a body of selected test cases.
This can provide insights that will suggest useful
changes in legal doctrine and practices.

Our current implementation of LDS is a small
prototype model of legal decisionmaking containing
rules representing negligence and liability laws.
This prototype contains rules describing formal
document and informal principles in product liabil-
ity. Future versions of the system will incor-
porate the other rule types shown in Figure 2. The model consists of approximately 90 rules, half of
which represent legal doctrine and principles.
Given a description of a product liability case the
model attempts to determine what theory of liabil-
ity applies, whether or not the defendant is liable,
how much the case is worth, and what an equitable
value for settlement would be. Once a decision is
reached the user may ask for an explanation in
terms of the rules used to reach the decision.

We will now describe the use of LDS to test
the effect of a legislative change on a case out-
come. The case is briefly summarized in Figure 3,
while the operation of the model on this case is
illustrated in Figure 4. The system was first ap-
plied using the definition of strict liability
given in Figure 1. It was determined that the de-
fendant was partially liable for damages under the
theory of comparative negligence, with the amount
of liability lying somewhere between $21,000 and

FORMAL DOCTRINE: rules used as the basis for
legal judgements such as legislation and common
law.

INFORMAL PRINCIPLES: rules that don't carry the
weight of formal law but are generally agreed
upon by legal practitioners. This includes
ambiguous concepts (e.g., reasonable and proper)
and generally accepted practices (e.g., pain and
suffering = 3 × medical expenses).

STRATEGIES: methods used by legal practitioners
to accomplish a goal, e.g., proving a product
defective.

SUBJECTIVE CONSIDERATIONS: rules that anticipate
the subjective responses of people involved in
legal interactions, e.g., the effect of plaintiff
attractiveness on the amount of money awarded, or
the effects of extreme injuries on liability
decisions.

SECONDARY EFFECTS: rules that describe the
interactions between rules, e.g., a change in the
law from contributory negligence to comparative
negligence may change other rules such as
strategies for settlement or anticipated behavior
of juries.

FIGURE 2. Components of Legal Decisionmaking
The plaintiff was cleaning a bathtub drain with a liquid cleaner when the cleaner exploded out of the drain causing severe burns and permanent scarring to his left arm. Medical expenses for the plaintiff were $6000, and he was unable to work for 200 working days, during which time his rate of pay was $47 per day.

The cleaner was manufactured and sold by the defendant, Stanway Chemical Company. The contents of the product were judged not to be defective by experts retained by the defendant. The product's label warned of potentially explosive chemical reactions from improper use of the product, but did not give a satisfactory description of means to avoid chemical reactions. The plaintiff was familiar with the product but did not flush out the drain before using the cleaner. The amount of the claim was $40,000.

The case was valued between $35,000 and $41,000. After the definition of strict liability was modified to state that the product must be unreasonably dangerous for strict liability to apply, the defendant was found to be not liable. In this prototype implementation of LDS a somewhat more restrictive ROSIE rule syntax was used than is shown in Figure 1.

V. CONCLUSIONS

Our preliminary work with LDS has demonstrated the feasibility of applying rule-based modeling techniques to the product liability area. In spite of the inherent complexity of product liability law, the number of basic concepts manipulated by the rules is easily handled (in the hundreds), while the number of rules required to adequately represent legal doctrine and strategies is manageable (in the thousands).

The rules that represent legal doctrine in this area are basically declarative in nature.

FIGURE 3. Description of Drain cleaner Case (Note: the model actually used a much more detailed description of of the case than is shown here.)

FIGURE 4. Inference Process for Drain Cleaner Case (Crosshatched area shows inference before law change)
Most of them are easily represented as definitions with complex antecedents and simple consequents that name the concept being defined. Rules of this sort can be organized as relatively unordered sets that are processed with a simple control scheme. Most of the action takes place in calls to other rule sets representing definitions of terms used by the initial set. This simple control structure facilitates rule modification and explanation.

In this application area improved methods are needed for dealing with vague or ambiguous concepts used in the rules. It is sometimes difficult to decide whether or not these concepts are applicable in a particular case, e.g., whether the use of the product was actually "reasonable and proper." Possibilities include gradual refinement: a query scheme involving presenting the user with increasingly specific sets of questions, each of which may have ambiguous terms that will be further refined by even more specific query lists, and analogy: displaying case histories involving similar prototypical concepts and having the user select the one closest to the term in question.

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REFERENCES


