

University of Toronto Department of Computer Science

Lecture 11: Agreeing Requirements

Last Week:
 Validating Requirements
 Philosophical Issues
 Reviews and Inspections
 Prototyping

This Week:
 Agreeing Requirements
 Negotiation and Conflict Resolution
 Requirements Prioritization

Next Week:
 Evolving Requirements
 Change management
 Inconsistency management
 Feature Interaction
 Product Families

© 2000-2003, Steve Easterbrook

University of Toronto Department of Computer Science

Conflict Resolution - basics

→ Defining Conflict

- ☞ In Social psychology, focus is on interdependence and perception:
 - "the interaction of interdependent people who perceive opposition of goals, aims, and values, and who see the other party as potentially interfering with the realization of these goals" [Putnam & Poole, 1987]
- ☞ In RE, focus typically is on logical inconsistency:
 - E.g. conflict is a divergence between goals - there is a feasible boundary condition that makes the goals inconsistent [van Lamsweerde et al. 1998]
- ☞ Note:
 - conflict may occur between individuals, groups, organizations, or different roles played by one person

→ Resolution Method:

- ☞ The approach used to settle a conflict
 - Methods include negotiation, competition, arbitration, coercion, and education
 - Not all conflicts need a resolution method: not all conflicts need to be resolved.
- ☞ Three broad types of resolution method can be distinguished:
 - Co-operative (or collaborative) methods, which include negotiation and education;
 - Competitive methods, which include combat, coercion and competition;
 - Third Party methods, which include arbitration and appeals to authority.

© 2000-2003, Steve Easterbrook

University of Toronto Department of Computer Science

Basic approaches to conflict resolution

→ Negotiation

- ☞ ...is collaborative exploration:
 - participants attempt to find a settlement that satisfies all parties as much as possible.
- ☞ also known as:
 - integrative behaviour
 - constructive negotiation
- ☞ distinct from:
 - distributive/competitive negotiation

→ Competition

- ☞ is maximizing your own gain:
 - no regard for the degree of satisfaction of other parties.
 - but not necessarily hostile!
- ☞ Extreme form:
 - when all gains by one party are at the expense of others
 - I.e a zero-sum game.

→ Third Party Resolution

- ☞ participants appeal to outside source
 - the rule-book, a figure of authority, or the toss of a coin.
 - can occur with the breakdown of either negotiation or competition as resolution methods.
- ☞ types of third party resolution
 - judicial: cases presented by each participant are taken into account
 - extra-judicial: a decision is determined by factors other than the cases presented (e.g. relative status of participants).
 - arbitrary: e.g. toss of a coin

→ Bidding and Bargaining

- ☞ Bidding:
 - participants state their desired terms
- ☞ Bargaining:
 - participants search for a satisfactory integration of bids.

© 2000-2003, Steve Easterbrook

University of Toronto Department of Computer Science

Conflict in Social Psychology

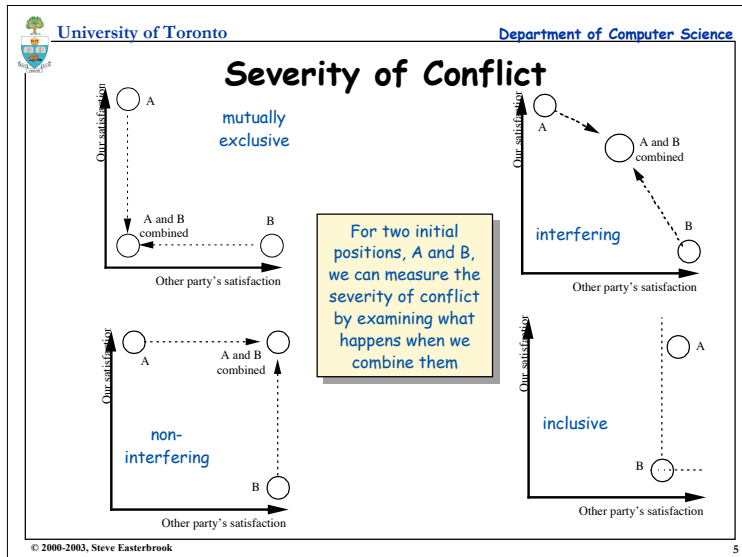
→ Causes of Conflict

- ☞ Deutsch (1973):
 - control over resources
 - preferences and nuisances (tastes or activities of one party impinge upon another)
 - values (a claim that a value or set of values should dominate)
 - beliefs (dispute over facts, information, reality, etc.)
 - the nature of the relationship between the parties.
- ☞ Robbins (1989):
 - communicational (insufficient exchange of information, noise, selective perception)
 - structural (goal compatibility, jurisdictional clarity, leadership style)
 - personal factors, (individual value systems, personality characteristics).

→ Interesting Results

- ☞ deviant behaviour & conflict are normal in small group decision making
- ☞ more aggression and less co-operation when communication is restricted
 - a decrease in communication tends to intensify a conflict (the contact hypothesis)
- ☞ heterogeneous teams experience more conflict;
- ☞ homogeneous groups are more likely to make high risk decisions (groupthink)
- ☞ effect of personality is overshadowed by situational and perceptual factors

© 2000-2003, Steve Easterbrook



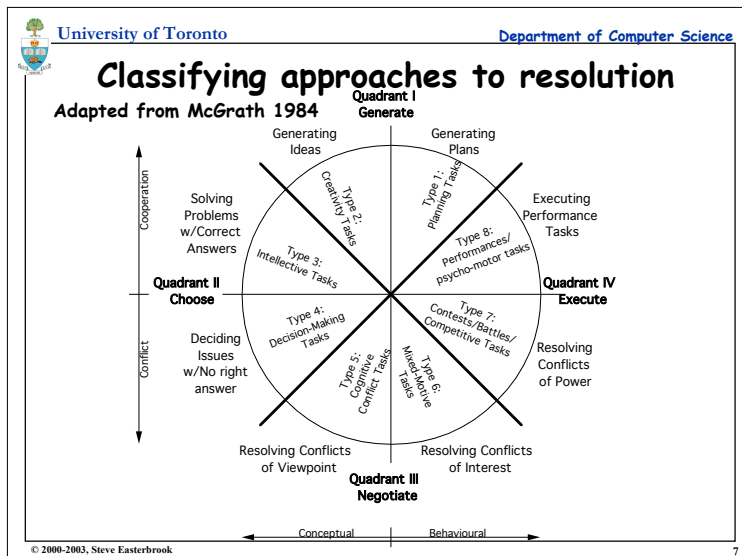
University of Toronto Department of Computer Science

Classification of Social Conflict

Adapted from Dahrendorf 1958:

Social Units	Equal vs. equal	Superordinate vs. subordinate	Whole vs. part
Roles	1 (family role vs. occupational role)	2 (occupational role vs. union role)	3 (social personality vs. family role)
Groups	4 (boys vs. girls in school class)	5 (father vs. children)	6 (nuclear family vs. extended family)
Sectors	7 (air force vs. army)	8 (management vs. union)	9 (Department vs. University)
Societies	10 (Protestants vs. Catholics)	11 (free men vs. slaves)	12 (state vs. criminal gang)
Suprasocietal relations	13 (soviet bloc vs. western bloc)	14 (Soviet Union vs. Hungary)	15 (Common Market vs. UK)

© 2000-2003, Steve Easterbrook 6



University of Toronto Department of Computer Science

Game Theory

→ Game Theory for conflict resolution

- Given:
 - 2 or more players
 - known utilities for each outcome for each player
- Can Calculate:
 - what strategy results in the better outcome
 - how strategies by different players interact
- E.g. Prisoner's dilemma:

	Not Confess	Confess
Prisoner A Not Confess	1 year each	10 years for A and 3 months for B
Prisoner A Confess	3 months for A and 10 years for B	8 years each

→ But:

- In RE, we often don't know what the utilities are
- Often can resolve conflicts by getting participants to change their utilities
- Often we don't know even what moves are possible!

© 2000-2003, Steve Easterbrook 8

University of Toronto Department of Computer Science

Using Argumentation Structuring...

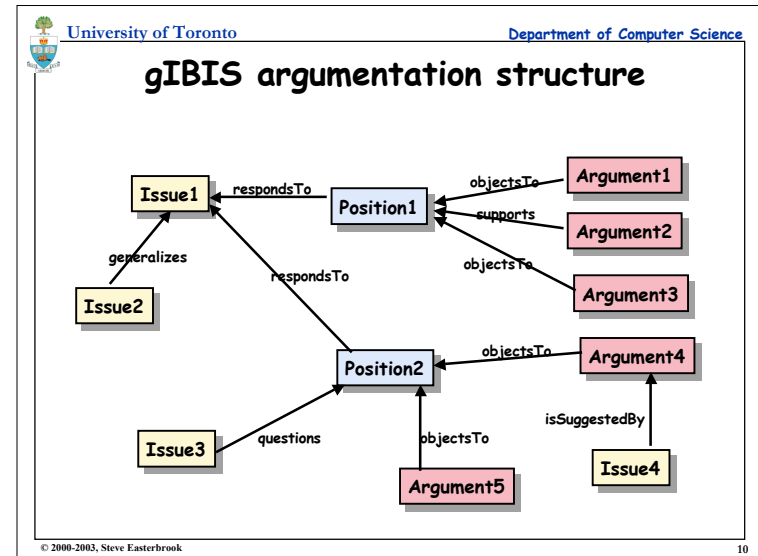
→ **gIBIS**

- ↳ developed by Conklin [1989]
- ↳ Represents argumentation process as a hypertextual graph
- ↳ Basic Process
 - Identify issues
 - Identify positions that one can adopt with respect to the positions
 - link arguments that support or refute positions

→ **Synoptic**

- ↳ Developed by Easterbrook [1991]
- ↳ Tool support for collaborative task-focussed negotiation
- ↳ Basic Process:
 - Get each participant to externalise their conceptual model(s)
 - Find correspondences between the models
 - Classify mismatches
 - Generate options for resolving each mismatch

© 2000-2003, Steve Easterbrook 9



University of Toronto Department of Computer Science

Using Pre-existing Domain Models...

→ **Oz**

- ↳ developed by Robinson [1992]
- ↳ Uses pre-existing domain model to compare conflicting perspectives
- ↳ Basic process:
 - Identify perspectives (collections of beliefs)
 - Record perspectives by annotating a domain model of goals and objectives
 - Domain model links product attributes to goals
 - Choose combinations of product attributes to maximise participants' satisfaction

→ **WinWin**

- ↳ developed by Boehm & colleagues [mid 1990s]
- ↳ explicitly identifies win-conditions for each participant
- ↳ Incorporates domain knowledge-base of quality requirements and product attribute links
- ↳ Basic Process:
 - Enter win conditions for each participant
 - identify attribute strategies for win conditions
 - determine negative effects for each strategy on each win condition
 - resolve disagreements manually

© 2000-2003, Steve Easterbrook 11