

MIXED CONVERGENCE PATTERN FOR INTELLIGENCE NEGOTIATION SUPPORT SYSTEMS OF HIGH-TECH NETWORK ORGANIZATION

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Abstract: According to the enterprise decision environment changes, negotiation conception and mode would be increasingly updated and deepened, which externally requires that intelligence decision method and network development technology is mutually combined. The paper summarizes domestic and foreign Intelligence Negotiation Support System (INSS) research and development, provides problem processing operation mechanism for network negotiation. Structure function and collaboration method based on Mixed Convergence Pattern (MCP) are pointed out, besides conflict resolution strategy schemes and operation rules for HTNO-INSS different execution states. It is concluded that scientific, visible and standard service for collaboration project in HTNO could be provided, as well as methods support for whole competitive power improvement in High-tech industry.

1 INTRODUCTION

Along with the global economic integration and knowledge economic dynamic development, the new technologies are superimposed reactions continuously, with the changes of business trading rules and economic technology cooperation forms (Kaklauskas et al., 2008). It is essential that high-tech enterprises oriented by innovation adjust strategies facing to the highly competitive environmental scenario. This adjustment is no longer the simple alliance, but the large-scale innovative cooperation with knowledge radial force in the domain of technology and production (Soneras, 2006). High-tech Network Organization (HTNO) is the lasting products of high-tech enterprise virtual business; the organizational mode reflects one community with unstructured and dynamic network, composed of different enterprises with the aims of mutual benefit, shared risks and extraordinary profit. Research on Negotiation Support System (NSS) stems in the late 1980s, it is decided as one branch

of Group Decision-making Support System. For scholars of all nations have different aspects in negotiation analysis of multi-type opinions of NSS cognitions. NSS is defined as software tools such as Research Briefs from Holsapple, Elliashberg, Alemi, Jelassi, Balakrishnan, Jones, Kersten (Ding and Li, 2002); NSS is the special Group Decision-making Support System for disagreement or controversy to assist negotiation partners such as Stedinger, Louucks, Thiessen (Tang and Meng, 2006); NSS has negotiation analysis and decision model functions and process support system such as Bellucci, Zeleznikow (Lecce and Amato, 2008). Despite some opinions, almost scholars could make NSS as the software support tools to improve negotiation efficiency and quality.

From the representativeness achievements, almost achievements in-depth study on remote INSS methods and theories, but there are some shortages. For instance, INSS only supports simple model for final resolution, when it faces to the complex negotiation projects and organizations, the

overwhelm functional explorations are lack of autonomy/independence dealing with transactions capabilities. Specially, when INSS is confronted with the unforeseeable events and emergency, it is essential to promote the reorganizing, reasoning and dispatching capabilities about Multi-issue and Multiple Attributes decision-making problems.

2 OPERATIONAL MECHANISMS FOR MIXED CONVERGENCE MODE AS MCP

Benefit-induced Pattern for HTNO-INSS pays close attention to individual Agent operational conditions of decision activities, explanation status and execution results; Benefit-perceived Pattern for HTNO-INSS could give full play to Intelligence System application on scenario simulation, preference recognition and utility estimation. how to take HTNO negotiation problems multiversity, multi-Agent dynamic negotiation and result Non-determinacy into consideration, how to express conflict-issue type, and acquire participants individual needs and so on, all these should be importance of Mixed convergence model for HTNO-INSS.

In HTNO-INSS, problem processing mechanism for Mixed Convergence Pattern (MCP) breaks benefit-induced driven and behavior-perceived driven system establishment methods, plans and recombines business functions around the center of Multi-part negotiation process, allocates assignment roles and transfers relative resource by Workflow Engine, analyzes and supports activity operation and management, until the final negotiation instance or solutions are acquired by the current business statement. The most prominent feature of HTNO-INSS driven by MCP is embodied in identifying individual Agent behavior type and group negotiation statement, decomposes HTNO assignment units, combines with case histories, expert experience and model object, and analyzing, designing, developing INSS to deal with Multi-part and Multi-issue negotiation process.

3 HTNO-INSS INFRASTRUCTURE DRIVEN BY MCP

HTNO-INSS establishes the virtual negotiation envi-

ronment for individual Agent, supported by network and communication technologies, supplies various basis bargaining value analysis and strategic forming tools, assisting alliance management institution to control negotiation schedules, real-timely grasps individual negotiation behaviors for reaching an agreement by Multi-agent conflict-resolution equilibriums, and finally forms Life-cycle management of HTNO negotiation. The mode process could be included of four stages, such as assignment executions and process, activity analysis and transfer, business control and management, problem resolution and application, implementation of HTNO-INSS is shown by Fig. 1.

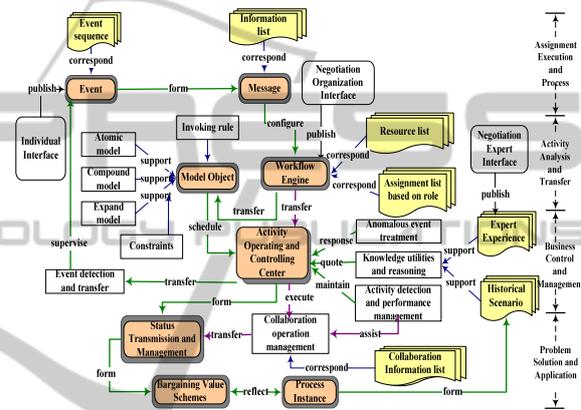


Figure 1: HTNO-INSS operation sketch map based on MCP.

A. Assignment Execution and Process. The stage is the key connection of individual Agent pending negotiation event queues of individual Agent in HTNO, it needs to establish the certain treatment, or answer some information requests, and information expresses individual personal interests and behavior characteristics. When some negotiation assignments execute corresponding decision-making, the certain knowledge parameters could require other Agent to finish some dealing activity for acquiring some valuable information by sending commands. In a similar way, other Agent establishes relationships with system by sending information when they execute desired activities.

B. Activity Analysis and Transfer. The stage is established on recognizing, gathering up and refining to negotiation assignment, individual behavior and business object, sufficiently describes the executive roles and required resource. Workflow Engine transfers corresponding Model Object by conflict attributes and types, and Model Object executions could be decided by invoking rules, which affect the constraints and executive methods

required, such sequence, parallel, selecting and iterative structure. Table. 1 could be signified as follows. Model object forms could be atomic models, or compound models, or expand models. Atomic model could be directly executed, without trying to make further the analysis; Compound model is coarse grain and reuse model consisting of Atomic model, with Atomic model attributes and relation operations among models; Expand model mains to evolution and development for Atomic model and Compound model.

Table 1: Executive pattern for negotiation events of HTNO-INSS.

Basis Pattern	Graphic Symbol	Pattern Explanations
sequence structure		$event_i$ is forerunner event, $event_j$ is Rear runner event.
parallel structure		$event_i$ and $event_j$ are branch event for parallel structure.
selecting structure		$event_i$ and $event_j$ are branch event for selecting structure
iterative structure		$event_i$ is the must-do executive event, $event_j$ is possible executive event.

Workflow Engine has three assignments in HTNO-INSS, consisting of corresponding assignment list produced, corresponding executive roles and resource list configured, corresponding assignment list updated. Active arrangements for assignment list are the executive process based on assignment explanation and transfer^[6]. The mode of expression is as follows,

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When int i=list.head; i<list.length; i=list.movenext
IF list[i].state=true // If pending conflict status is ready
Then Push (list[i]) // We interpose conflict event to ready queue
Else Listi.sign=1 // The command signifies conflict-issue visited
ENDIF
Judge(list[i]) // Dealing with the direct subsequent activities for conflict object, we mark the subsequent activities visited. After it is finished, the ready status would be deleted.
ENDWHEN
    
```

Workflow Engine classifies, discerns and explains to interactive information during Agent communications, determines assignment executive

area and request based on HTNO roles, transfers negotiation decision-making model according to active status of business object, saves the analysis results of business activities, and renews corresponding assignment and resource list. Above all, executive expressions of business process are serial or parallel sequence by event and assignment interlaced.

C. Business Control and Management. Activity operation and control center is important for negotiation business process management, in charge of transferring ready activity from assignment list and collaborating with negotiation decision model, detecting and performance managing for executive activity. Operation control mains to the anomalous event treated, opportunely detects new conflict events, which inquires activity operative status, also gathers and analyzes for status data. In the whole working process of HTNO-INSS, we should guarantee that the activities are in operation status as many as possible to the best of our capability; business management depends on quantitative and qualitative knowledge in relative problem domain, realizing the reciprocity and intercommunion between negotiation expert experience and scenario knowledge, and then complete negotiation knowledge utilities and reasoning.

D. Problem Solving and Application. Problem solving and application are the results exemplification for business control and management, the solving schemes includes bargaining solution formed and process instance produced. Bargaining solving schemes is used for issue attribute value reaching an agreement of multi-Agent in HTNO, process instances are the protocols templates, cooperation rules and scenarios analyses formed during issue solving process, which provide experience information and knowledge for negotiation activities of relative conflict issues. Statement transformation and management take charge of recording operation status and mutual exchanging relationship; the goal status forming is the pivotal content for collaboration operation management.

4 COPYRIGHT FORM COMPLETION AND TRANSITION FOR MIXED CONVERGENCE PATTERN (MCP)

Statement and activity transitions among HTNO-INSS depend on individual Agent satisfaction degree to benefit schemes, and manager Agent collaborated capabilities. However, when group negotiation reaches an impasse, system maintains the original negotiation protocols, or adjusts invoking rules and constraint conditions for model objects. HTNO-INSS execution results have six forms, such as Waiting, Ready, Running, Quit, Aborted and Completed. Fig.2 shows relations of every expression forms in HTNO negotiation activity statement.

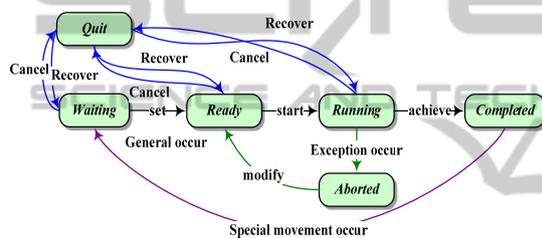


Figure 2: Activity transition status for HTNO-INSS.

Therefore, we could discover that INSS problem processing strategies are divided of three executive forms, according to negotiation events happening types and activities transition, the first type is regular events transition status, that is original status , ready state satisfying invoked conditions, activity operational status and the whole negotiation completed; the second type is anomalous event transition status, that is hanging up executive activity, amending ready state for renew exploring activity schedules, or the executive activity canceled by individual Agent, the current status resumed after system is handled. The third type is special event transition status, activity finishing state is reset to original statement by individual Agent, that is status parameters or participants altered, conflict-issue schemes amended.

5 CONCLUSIONS

HTNO-INSS is a man-machine interface system driven by Benefit-induced and Behavior-perceived Patterns, which could assist individual Agent to analyze pre-negotiation situation and prepare

tactically, deals with real-time data and information during mutual bargaining for forming conflict resolutions, and finally reaches scientifically operational schemes. Mixed Convergence Pattern (MCP) not only supply resolution technology theories and method tools for alliance management institution, creates fair, impartial and friendly decision-making environment for HTNO participants, gives full play to alliance governing Competency, guarantees system operational stationary and data transmission accuracy.

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REFERENCES

Kaklauskas, A., Kersuliene V., Urbanaviciene V., 2008. Determination of rational method for resolution of disputes with the help of multi-criteria negotiation decision support system for real estate. In *25th International Symposium on Automation and Robotic in Construction*. ISARC-2008, pp. 585-591, 2008.

Sonerlas M., 2006. N-site: A distributed consensus building and negotiation support system. *International Journal of Information Technology*, 5: 123-154.

Ding W., Li Y. J., 2002. The latest researching advance for NSS. *High Technology Letters*, 3: 91-95.

Tang M., Meng B., 2006. Research on Electronic Business Negotiation Support System Based on Agent and CBR. *Application Research of Computers*, 3: 64-69.

Lecce D., Amato A., 2008. Multi Agent Negotiation for a Decision Support System in Route Planning. In *International Conference on Computational Intelligence for Modelling Control*, pp. 458-463.

Tan W., Lu Z. Y., et al., 2007. Model-Driven Enterprise Process Cooperative Enactment Environment. *Journal of Sichuan University (Engineering Science Edition)*, 1-4.