For office use only	Team Control Number	For office use only
T1 _____	33131	F1 _____
T2 _____		F2 _____
T3 _____	Problem Chosen	F3 _____
T4 _____	**C**	F4 _____

2015

Mathematical Contest in Modeling (MCM/ICM) Summary Sheet

(Attach a copy of this page to your solution paper.)

Type a summary of your results on this page. Do not include the name of your school, advisor, or team members on this page.

The organizational churn is a term to describe the turbulence caused by some employees leaving for other jobs. Since the HR manager wants to automate and analyze the human capital using network science, we establish a Human Capital Model and its improved model to simulate this phenomenon and analyze its influence.

For Task 1, we construct the directed weighted employee network based on the 370th-order relationship matrix. We propose an Employee Relation Model based on the SNA (social network analysis) technique. It calculates the "distance" between employees considering two main aspects in human relationship. Meanwhile each node (employee) in the network has several characteristics which are used to evaluate the employee corresponding to the node. We calculate the grade of each employee by evaluating based on AHP (analytic hierarchy process) technique. Based on these grades, we predict the promotion probability for each employee in the company.

For Task 2, we establish an Organizational Churn Model to simulate the effects caused by the leaving of employees. Furthermore, we introduce a new method to calculate the productivity considering five factors, including churn rate, team cohesiveness, employee ability, work experience and salary.

For Task 3 and 4, we calculate the budget for the next two years and analyze the influence of different churn rates. Our data show that the cost of recruitment increases, while the cost of training and salary decreases when the churn rate rises.

For Task 5, we simulate the situation which doesn't have external recruitment, and get the result that the amount of employees decreases rapidly.

For Task 6, we discuss the potential usage of team science and multi-layered network and apply them into our model.

Moreover, we propose an improved version of our model which can analyze the influence of reassignment and provide reference value to HR managers for incentive mechanism.

Finally, we conduct a sensitivity analysis to study the robustness of our algorithm, and the results show a good stability. The strengths and the weaknesses of our models are discussed in the end.