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SOCIAL CLOUD COMPUTING FOR HUMAN RESOURCES' PERFORMANCE RISK ASSESSMENT AND MANAGEMENT

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Abstract

This modified implementation of CLOURAM (Cloud Risk Assessment and Management) simulates non-technical (i.e. human kind) by mimicking the future planned Human Resources (such as HRG: Human Resources Group, or FRG: First Responder Group in County or City Police/Fire Department, or Hospital Service etc.) personnel activities if the proper "personnel input" and "customer service demand" are fed. These grouped input are fed into the program about the personnel with their daily working habits of how often they fail to come to work (rate of absence for whatever reasons) or how long it takes to return (rate of recovery) from their expected absence and their daily working hourly capacities in a merit order. Also load (demand) hours expected to perform by the existing personnel will be entered as input. Outcome will appear as percentage (or unreliability) of supply for not satisfying the demand (service) in an hourly or daily curve and also how many work hours lost. Graphical diagrams will illustrate those bottlenecks, and what stage of the exposure period one is experiencing these unfavorable lost hours of work-force and what to do.

1. Introduction and Motivation

The motivational aspects of such novel idea can be summarized as follow:

- Current lack of digital simulators for future human resources availability planning.
- Incident commanders need to monitor HRG availability.
- Emergency response situations require efficient coordination and allocation of available resources that need to be controlled.
- Recent natural and man-made disasters have reinforced the need for stronger HRG response knowledge using objective IT solutions.

What does Social CLOUD implementation bring new to the table?

- A tested, peer-reviewed, accurate & scalable algorithm.
- An insightful and meaningful system availability prediction model combined with historical resource and service data.
- Easy to implement, user defined and user friendly easy-to-explain tool.
- This project will be vital to HRG leaders monitoring availability.
- The project team is proposing to model the daily operational realities of a defined but limited e.g. county/city, the First Responder Group's (FRG) activities such as Firefighters or Police Force. In doing so, SOCIAL CLOUD will be applied by collecting city/county historical data. City/county FRG operations will be positively impacted by assessing and managing First Responder availability by implementing this project in the course of daily emergency operations.
- United States regional HRGs will perform simulation tasks and assess an index of unavailability, then manage risk by responding to what if remedial questions, conveniently applicable by using the CLOURAM (the tool name for SOCIAL CLOUD). The scalable and flexible program will be easily accessible for government FRG agencies with real-time availability improvement practices and preventive measures so as to act timely and efficiently. What-if queries offer usable projections for HRG reservists or back-ups, and other operations with ease and minimal effort, without having to wait for a lengthy data collection to act.
- Finally, the development and implementation of the proposed application will significantly improve the area's emergency response capability. This algorithmic tool not only assesses availability shortfalls but also enables emergency response planning in terms of staffing and maintenance. See Sahinoglu et al (2011) and (2012) for Cloud modeling; Leavitt (2009) for non-technical factors.

2. Numerical Example for Social CLOUD (200 employees active)

In a hypothetical HRG (Human Resources Group) serving in a county's first-responder or similar department, or a private banking or any small or large scale agency or corporation, there may exist 8 groups each of which contain 25 servers, a total of 200 employees. As in Figure 1, the first ranking (in merit order) Group 1 with 25 servers who perform with a capacity of 10 hours/day have an absence (sickness or else) of 1 in 100 days (0.01/day) and recovery (return) of 1/day. This is indicating that absentees, once in 100 days, return after a day of absence from the work on the average. Assuming, the times to absence and recovery are negative exponentially distributed, for the sake of example, with mean time to absence, (1/absence rate=1/0.01=100 days) and mean time to recovery

(1/return rate=1/1=1 day). If other distributions are desired, then one can utilize the Weibull option (Weibull=1 means default case of negative exponential) other than Weibull Shape Parameter=1. This continues until 8 groups are completed as captured in two separate screenshots in Figure 1 Load (or service demand) values are displayed for 1000 days of service each at a constant 1200 required hours of service/day as a constant.

However, varying load values can be also entered at will as well as vacation time. A maintenance or back-up reservist cadre of ideal 200 employees is set aside. The unreliability (probability) of not meeting the demand is 6.21% using the input data in Figure 1 evident from output in Figure 2 after 1000 simulations covering 1000 hours of demanded service. It takes 30 seconds to perform 1000 times 1000 hours of exposure time. In Figure 2, this time only 2 backup personnel are used to cover a base of 2000 employees. The probability of not meeting the demand (unreliability) increases to 23.3% from an earlier 6.21%. In fact, there is no improvement of reliability reducing the crew from 200 down to 4. This means that there is no need to keep a reservist cadre more than 5 backup employees so as not to waste money by overinvesting. New what-if scenarios, other than back-ups, such as modifying the load values and # of employees or adding capacity (employees) in the work force can be simulated to see what can be saved. This way of digitally simulating saves solid money and time by mimicking the future HR operations rather than fatefully waiting fto observe what happens by trial and error. This practice by simulating the future operations is wiser and cheaper. Figure 4 shows one individual unit's or employee's performance cycle, i.e. red (off), green (on) or yellow (waiting to return). This way one can plan the future activities of this HR or FRG personnel to avoid wastes of resources to secure a quasioptimal run.

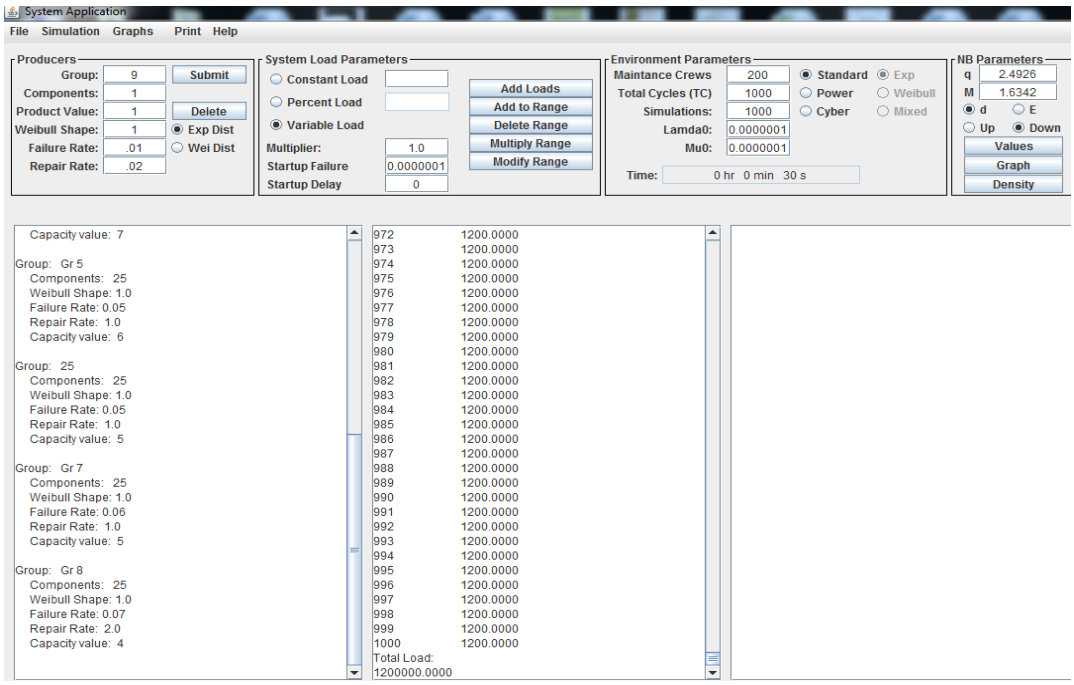


Figure1: Input data for 8 working groups of 200 personnel data for 1000 load cycles.

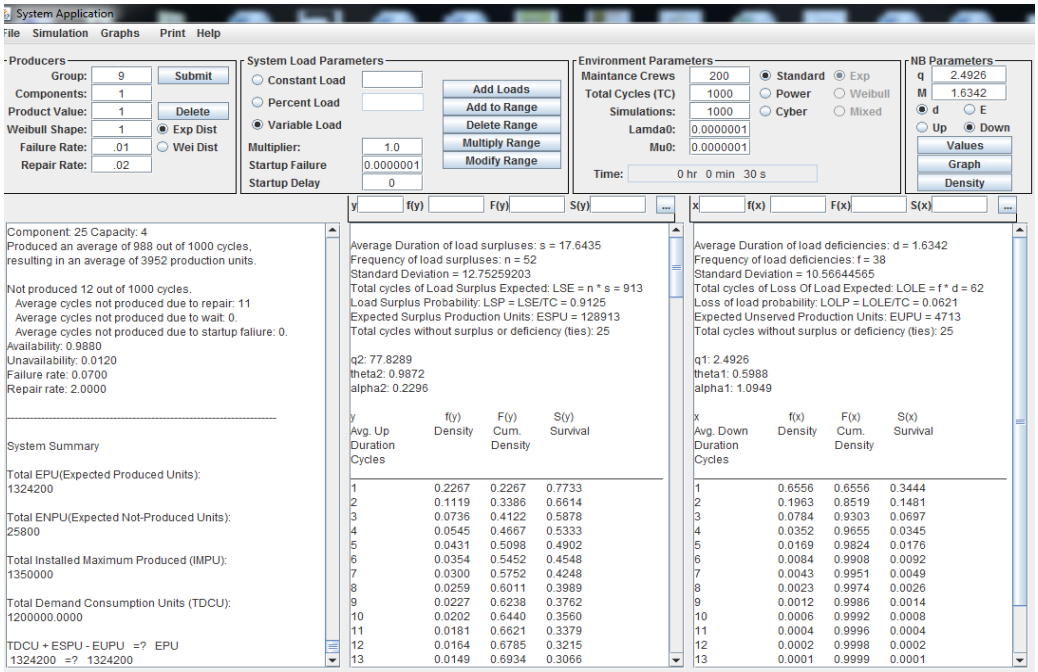


Figure 2: CLOURAM (Social CLOUD) output for input in Figure 1 for 200 repair crews.

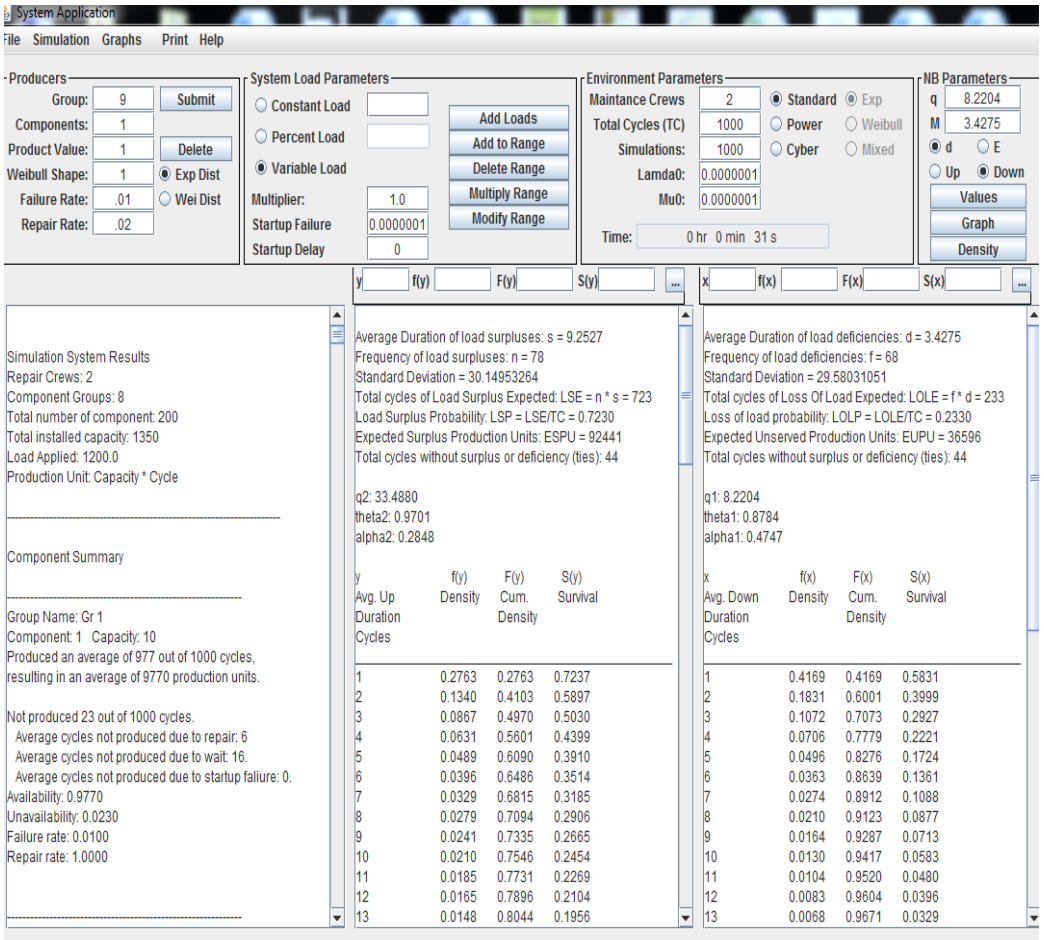


Figure 3: CLOURAM (Social CLOUD) output for the input in Figure 1 for 2 repair crew

3. Input Wizard Example for Social CLOUD (200 employees active)

The following screenshots in Figure 5 and 6 illustrate how Input Wizard in the Cloud Assessment Java tool enters the data for Figure 1 through a sequence of dialog boxes, from left to right and top to bottom for production and load data.

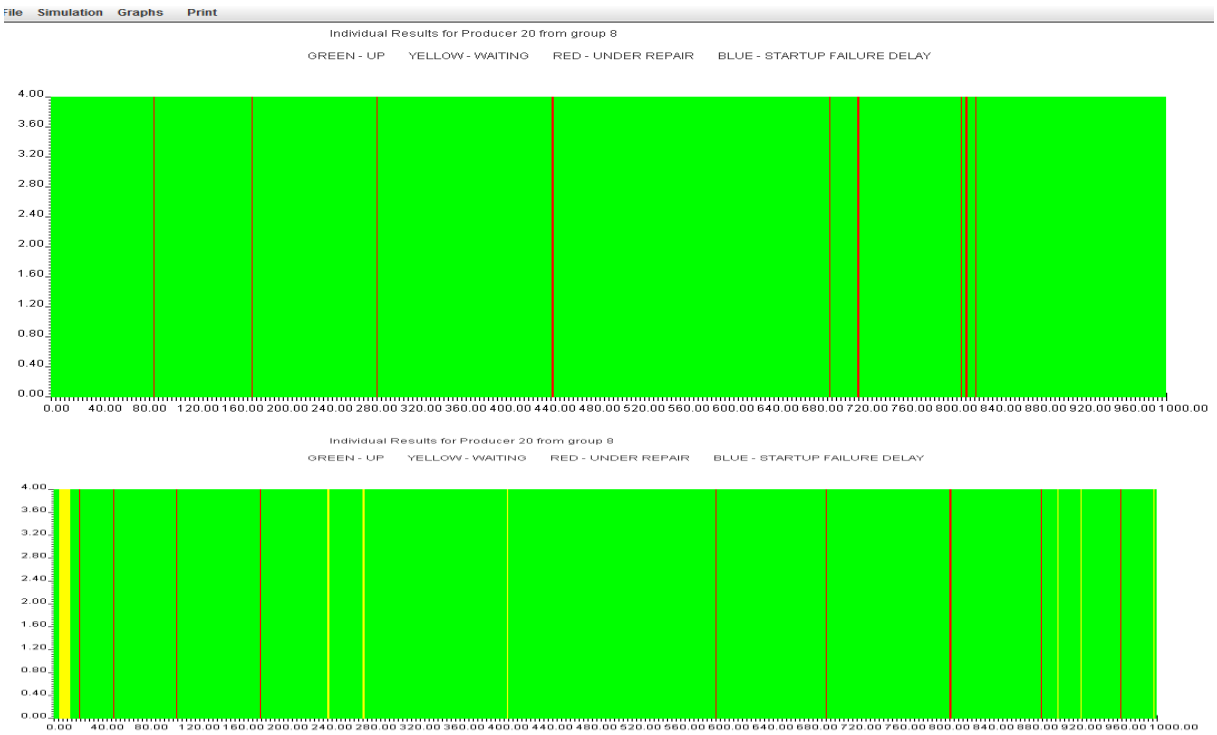
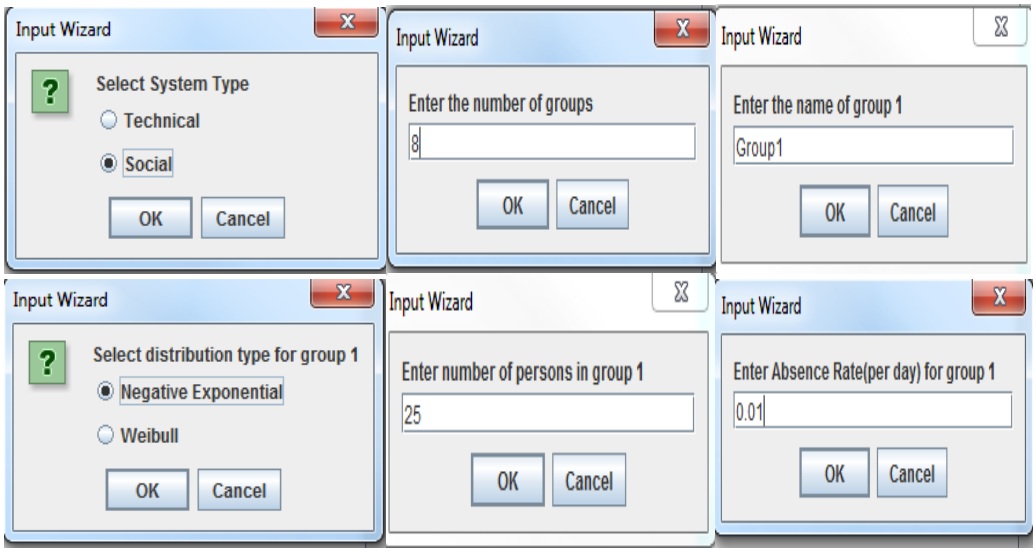


Figure 4: The individual (e.g. Group 8 server 20) for 1000 cycles regarding 200 and 2 backups. Above, yellow time windows appear for waiting due to perfectly sufficient back-up personnel. Below, sporadic yellow waiting windows due the back-ups to arrive before servers return to green (work) after red (absent).



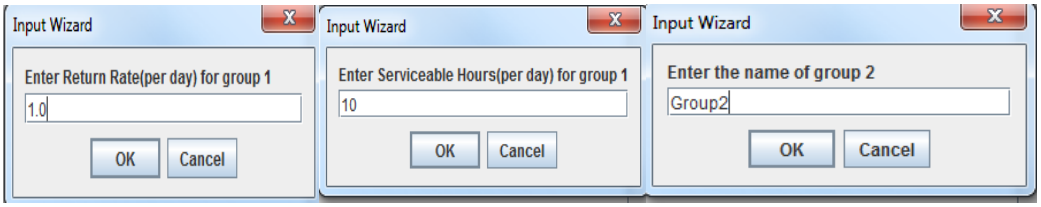


Figure 5: Product data entered one by one in sequence with Input Wizard from the CLOUD Assessment Java tool.

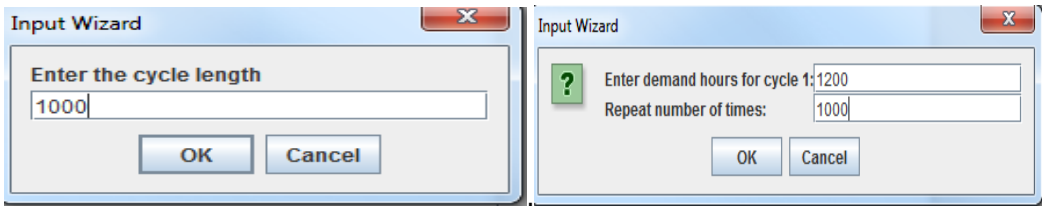


Figure 6: Load data entered in sequence left-to-right and top-to-bottom with Input Wizard from the CLOUD Assessment Java tool.

4. Conclusions

This tool proves useful for planning manpower to schedule or economize work-force. It is based on logical principles rather than haphazard guess-work which can vary from one supervisor to another. Social Clouds can be effective like physical ones. Observing our example in Figure 3, we run 1000 times a period of 100 days or 6 months or a year of FRG or HRG activity ahead. Also for each responder in each group, we can see on the average where FRG or HRG personnel are failing to contribute so that we can work on remedial countermeasures regarding those weak spots. Last but not least, we can also execute back-up or reserve personnel contingencies. Say, we have 20% back-up reserve we have in the payroll or should we have only maybe 5% or less, so that we can save on the expenses? Overall for market planning in terms of substitute crew or new employees to add, the “Social Cloud” is necessary.

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