ABSTRACT

This paper describes the design and application of a business simulation to help train employees about the new business model and culture that for an automotive supplier company that designs connected vehicle and other advanced electronic products for the automotive industry. The simulation, called SIM-i-TRI, is a three to four day collaborative learning activity that simulates the executive, administrative, engineering, manufacturing, and marketing functions in three divisions of a manufacturer that supplies parts and systems to customers in industries similar to the automotive industry. It was originally designed to support the new employee orientation at the Tier 1 supplier and to provide the participants a safe environment to practice the lessons from the orientation. The simulation has been used several times a month in the US, England, and Germany for over four years. It is now being used by Ann Arbor SPARK, a non-profit organization, is the driving force in establishing the Ann Arbor region as a destination for business expansion, retention, and location by identifying and meeting the needs of business at every stage, from startups to large organizations. The University of Michigan is currently developing a computer network adaptation of the simulation for application in remote locations. The intent is to use the simulation as a capstone exercise in the business course for engineers at UM - Dearborn. This type of simulation is essential to provide students with a realistic environment where they can learn through action and practice the social and business management skills from the training.

INTRODUCTION

The simulation, which we have dubbed Sim-I-Tri, exposes the new employees to management dilemmas that they can resolve by adopting strategies based selected management principles and philosophies. The management principles are initially conveyed in the orientation content modules. The purpose of the simulation is to help the new employees gain a better understanding of the orientation materials by creating an engaging learning environment where they are pressed to resolve a number of cultural, process, and product dilemmas associated the new way of doing business.

Sim-I-Tri helps the new employees fully engage in the learning process and gain better insight into two critical areas - overarching themes and specific content. Additionally, the simulation facilitates the level of social interaction among the participants at the orientation and help increase the level of energy and information transfer from the orientation to the workplace. The following themes that are stressed:

- Mission and vision
- Values and behaviors
- Corporate culture and valuing diversity
- The Enterprise View

The simulation surfaces management and production dilemmas that employees face on the job. Learning to properly manage such dilemmas provides participants insight into their own values and behaviors in relation to the organization's mission/ vision, strategy and values (e.g. culture and diversity). Core dilemmas of building a business around integrated automotive electronics products are: tactical vs. strategic leadership, critical vs. open minded thinking, focused vs. big picture thinking, “tried and true” vs. innovation, authority driven vs. entrepreneurial, autonomous units vs. cooperative, units relationship-building vs. measured results, quality and features vs. price and cost, global market vs. target market, and internal needs vs. customer focus.

The New Employee Orientation is a five-day learning experience comprised of two distinct, yet totally integrated learning components: (1) a role-play simulation of a systems
integration supplier company, and (2) a set of ten training modules. Together, the simulation and modules provide a significant learning experience that has the potential to change the way employees think about their work and overall job performance.

We are in the process of implementing this business simulation in virtual world development environment. Not only will this simplify the set up and administration of the simulation activities. Virtual environments like Second Life offer several additional advantages. Virtual environments are being used in educational and business settings to solve real world problems [1] [2]. Some critics describe virtual environments such as Second Life as clumsy and initially difficult to learn [3]. Some authors have shown that tools similar to Second Life can provide inexpensive, viable test beds for developing solutions to real life problems [4]. Virtual worlds allow for participants to be in geographically dispersed locations. Virtual worlds can provide flexible and adaptable environments for presenting multiple scenarios within a problem domain [6]. Even though virtual worlds only provide a simulation, participants are often quick to suspend their disbelief and engage themselves as if each scenario is real [7]. Some investigators report creating a series of Second Life games to foster team development [8]. At least one author has reported that using role-playing scenarios eases the tensions of unpredictability in new situations and helps people to collaborate with each other in subsequent activities [9].

This paper presents the overall concept for Sim-I-Tri based on nine primary “elements” that serve as the building blocks for games and simulations. A similar simulation design process was applied in the Ecosystem Framework Policy Exercise and the Intelligent Transportation System Policy Exercise [10].

**Sim-I-Tri Overview**

Sim-I-Tri places the new employees in roles as managers of Sim-I-Tri, Inc, a leading supplier of integrated systems with a focus on global marketing and sales. The participants engage in realistically structured management situations and learn to resolve prevalent dilemmas by applying the appropriate values and behaviors.

The name of the simulated company is Sim-I-Tri. Sim-I-Tri designs, manufactures and sells building automation systems and split from its parent company (AutoTech) just 2 years ago. Auto-Tech is a major Telecommunications and Electronics Corporation. The descriptions and the corresponding simulation dynamics have been designed to simulate the OEM - Tier 1 supplier relationship.

The products, components and systems Sim-I-Tri makes, automate control of the environment, such as lighting,
temperature, security, communication, and entertainment. Sim-I-Tri systems allow all these controls to be programmed into one system. The customers in the simulation are split into various markets.

The simulated organization is a global producer of (automotive) systems, modules, and component groups. Similar to the original Tier 1 Supplier, thirty sales, engineering, and technical centers around the world support their advanced technology and marketing efforts. Sim-I-Tri, Inc. has a portfolio of products and technology designed to deliver fully integrated systems to (auto) manufacturers around the world. Last year, global sales revenues were approximately $17 billion. The organization has 3 divisions: a Strategic Business Unit, Marketing, and Engineering. Their management staff includes: Vice President of Marketing, Sales, and Service, Vice President of Operations, and Vice President of Technology and Support Operations.

Sim-I-Tri, Inc. has a tremendous depth of engineering, technological, and global resources and would like to expand growth in the area of system integration; however, their key competitors have more experience as global systems integrators. They intend to compete in globally sourced integrated systems bidding in addition to their main customer. Accomplishing these goals are facilitated by:

• Re-defining the concepts of effective decision making and effective methods of execution within the area of strategic collaboration,

• Institutionalizing positive changes in an organization formerly know for their hierarchical structure and “impenetrable chimneys” that exist throughout the divisions, and

• Improving their focus on customer service and customer access.

A consistent theme throughout is that Sim-I-Tri, Inc. is focused on a direct path to organizational change. At the vortex of this turbulent environment is The Enterprise Business Model. The model is viewed as the essence of this changeling organization and constitutes a solid foundation for future success on the organization's chosen path. Because of the strength of their philosophy, corporate structure, product lines and services, and strategic vision, The Enterprise Model is the organizational fulcrum and translates the Sim-I-Tri Mission into Results.

However, in order to lead the organization on the path to positive change, employees must increase their knowledge base and expand their view of the Business Universe. They must also cultivate a new Business Culture in the process. If the company wishes to reach its final destination, it must become the best systems integrator in the world.

Sim-I-Tri, Inc. is focused on becoming a fully integrated, holistic organization within an industry-wide and global marketplace. Management desires their employees to realize their potential, from both an individual and business perspective. The themes of redefining success at a new level and of continuous improvement are consistent themes throughout the simulation.

The simulation advances one to two cycles each day over five-day orientation period. Each cycle represents a 6-month business period taking the employees approximately five years into the future.

During a cycle the participants engage in product development, systems engineering, marketing research, and customer support tasks. Sim-I-Tri, Inc. focuses on designing, developing and delivering fully integrated systems. It also supports a global sales and marketing staff that conducts customer research and use technical expertise to address the needs of the customer. Sim-I-Tri has three divisions similar in structure to those in company and several Strategic Business Units (SBUs) which represent the entrepreneurial foundation of the company with profit and loss interests at stake. Each SBU is accountable for overall profit and loss. Resolution of the management dilemmas are accomplished by adopting new values and behaviors that are closely aligned with an “enterprise model” of organizational structure and behavior.

In lieu of building actual products, Sim-I-Tri participants build loops n product boards shaped as triangles and displayed on gray market panels. They work to build one product per market panel. Each market panel holds 4 color-coded product boards that interface to form one product.

• Green -Climate Control & Lighting

• Orange-Safety & Security

• Purple- Entertainment & Communication

• White- Customer Interface.

Each triangular product board on the market panel represents a manufacturing plant. An empty product board indicates an idle plant. A product board with a loop on it represents a plant that is operational. When the simulation begins some product boards have product loops on them and others are empty.

The interface is the system that enables the products from the green, orange and purple divisions to work together as a single system).

A product is simulated as a rainbow colored loop that is made from various magnetic card shapes referred to as capability cards. These loops are created on the triangular color-coded product boards.

Each division has a manufacturing plant (triangle) on each market panel. When the simulation begins there are 4
triangles on each market panel. (One for each division and a customer interface board.) Initially the customer provides an interface board that links an orange (Safety & Security) component, a green (Climate Control & Lighting) component, and a purple (Entertainment & Communications) component, to create the product they are currently selling as a single module in that market. The customer's product attached to the gray market panel with Velcro.

The content of the simulation is represented in the simulation schematic that captures the organizational mission, the enterprise view, values and behaviors, and selected dilemmas, which the simulation focuses on. Simulation activities are integrated with training activities associated with ten content modules. The specific areas of the simulation concepts addressed in this report include the specifications, the simulation schematic, an overview of the orientation environment, and details of the business simulation activities.

The simulation is played in 7 cycles over a three day to four-day period. Each cycle represents 6 months in the life of the SIM-i-TRI Corporation. The participants volunteer for the

<table>
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<th>Commercial</th>
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<td>Auto Tech</td>
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<td>Intelligent Interiors</td>
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role that they play and share that role with at least one other person. After cycle 4, the participants have the option to cross train and to play another role if they choose. In each simulation cycle the same steps of play are: research and develop new products (40 min.), calculate costs (5 min.), assess performance (15 min.), corporate meeting (15 min.), and facilitator debrief (10 -20 min.) At the conclusion of each Cycle the facilitator debriefs the participants to reinforce the key learning points, and to link simulation experience back to work.

Purpose of Sim-I-Tri
The original purpose of Sim-I-Tri was to help the employees, new and transfer, better understand and adopt the new company culture including: Values and Behaviors, the Enterprise Model, and Businesses Processes. All personnel needed information about the enterprise, how the business is run and organized, and how goals are met. The company wanted to have new employees be excited and energized by the orientation and to be able to transfer this energy into the daily work environment.

The primary goal for the orientation is to support a highly interactive training/orientation environment so those employees are engaged in an active and socially interactive learning process. At the conclusion of the orientation, participants: understand values and behaviors, articulate company brand, understand organizational structure, appreciate the company culture, understand company identify, know the performance appraisal process, comprehend the marketplace, and leave the orientation with energy and excitement for the company.

Gaming an Enterprise View
The Enterprise View is based upon the view of the customer, taking the whole of the organization into consideration [11]. The automotive supplier desired to operate as a fully integrated organization indivisible from the customer.

The Tier 1 supplier wanted to adopt The Enterprise View formulated on the following premises:

1. Creation of an internal market economy (within which the individual strategic business units operate, to a certain degree) as a self-organizing system in order to encourage an entrepreneurial attitude;
2. Collaborative behavior across organizational boundaries are felt and recognized throughout the entire automotive industry on two fronts: Company's overall image with the customer base as well as internally where employees have a clear concept of the rewards associated with participatory management;
3. Movement toward new levels of creativity is accelerated by collective knowledge and;

4. Demonstrating an appreciation for diverse thought and ideas propel the company towards successful operation in the global marketplace.

The problem environment, as defined by the Schematic, is the basis for the design of the simulation. For practical reasons, not all of the complexity of the real world can be included in a simulation. Individual elements were prioritized for inclusion. It was determined that the following system components carried the greatest weight in terms of what new and transfer employees should address in the simulation. Several components were identified as very important for acquainting the new employees to the organization. The key dilemmas are identified.

The simulation was designed to surface dilemmas that employees face on the job. These dilemmas provide participants insight into their own values and behaviors in relation to the organization's mission/vision, strategy and values (e.g. culture and diversity).

The dilemmas that are built into the simulation are as follows:

• Tactical Vs. Strategic Decision Making. Managing the details of your work for the short term, while at the same time, managing at the strategic level for the longer term.
• Critical Vs. Open Minded Thinking. Managing with a critical eye while at the same time, having an open mind to new ways of thinking.
• Focused Vs. Big Picture Thinking. Managing for only your work group or division versus managing for the benefit of the whole company.
• Status Quo Vs. Innovation. Managing based on a proven track record (“we have always done it this way”), versus taking risks to see what is possible.
• Authority Driven Vs. Entrepreneurial. Managing through the chain of command with all its time-consuming constraints, versus managing for the purpose of being able to “run” with new ideas.
• Autonomous Business Units Vs. Cooperative Business Units. Managing your business unit is an island, self-sufficient and protective, versus managing your business unit in cooperation with other business units to leverage resources and lessons learned for the sake of the company.
• Time for Relationship-Building Vs. Generating Results. Managing to get the results needed to succeed in our job while at the same time taking time to build relationships, because a large portion of our work is done through people.
• Quality and Features Vs. Price and Cost. Managing to obtain the best quality and features possible, while at the same time, managing to keep cost and price within market demand.
Satisfied Global Market Vs. Product Driven. Managing our products to satisfy a global market, while at the same time managing our products to be the best.

In terms of overall emphasis of the key dilemmas, those pertaining to Culture are primary, Process dilemmas are secondary with Products and Services ranked as third most important.

As previously stated, Sim-I-Tri is run throughout the five-day period. The primary purpose for this format is to: (1) reinforce the material presented in the content modules, (2) move participants into increasingly complex tasks as the days progress, and (3) create “discussion layers” by addressing both communication and task oriented problems presented in the exercise. Facilitator directed comparisons and contrast is possible using this format. Critiques at the conclusion of each cycle are intended to reinforce concepts, provide insight, and create a “forum” for participants to air frustrations experienced in the simulation process. Day Five includes a longer debriefing session.

Step by step, participants:

• Gain perspective on the company as a new organization positioned within a changing marketplace,
• Explore particular issues related to customer service and customer success,
• Apply new management concepts and paradigms and understand new company philosophies,
• Discuss concerns related to the above issues; and,
• Capture the best ideas from the learning modules, simulation, and discussions, and transfer ideas into the workplace.

Simulation Objectives
The primary purpose of the simulation is to support the New Employee Orientation by making it highly interactive and stimulating for the new employees. The intent of the interactive format is to increase participant learning and transferability to the work environment. It should also help to make the learning experience more enjoyable and memorable. The following is a set of objectives for the simulation:

• Create a simulated work environment where the participants can identify with the organizational mission, managerial roles, organizational structure and process, and where they can apply relevant management lessons from the content modules.
• Provide a set of work tasks where the participants can work on systems integration through cooperating with other parts of the organization.

• Introduce the participants to the Enterprise Model in action, showing the management systems process including business and strategic planning, human resources development, shareholder value assurance, advanced technology development, and the quality operating system.
• Provide an environment for the participants to apply the values and behaviors including the development of effective relationships with customers, colleagues, and the organization.
• Create a payoff structure that creates management dilemmas that can be effectively addressed through the Enterprise Model, values and behaviors, and support of the organizational culture.

Roles
Just as in the real world, Marketing Managers look for trends in consumer purchasing. That is largely based on added value to the customer. (What type of products should we design? Do mini-vans sell better than station wagons? Do trucks sell better than sport utility vehicles? What kinds of “extra” features add the most value?)

Marketing Managers provide the market information through research. This information is simulated in numerical values uncovered along the path of the product loop. The sum of the values in the product loop path, equal the unit value of that product.

Figure 4. Marketing Manager Product Research Board

The Marketing Manager also sets the price. This is simply a “guesstimate” based on how the price performed in the market last Cycle. Of course, the Marketing Manager would want to confer with the Manufacturing Manager to make sure they setting a price that is high enough to cover costs, but as
in the real world, no one knows for sure, how the price will perform in the marketplace.

The Marketing Manager obtains their sales volume numbers from a custom-designed computer program. This program is actually a spreadsheet-type database that was designed to slightly adjust the sales volumes every cycle (6 months in “Sim-I-Tri time”) based on pre-determined market size and market growth information. Market size and market growth information is found in the facilitator setup book, and is

<table>
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<th>Make Organization Customers Successful</th>
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<tbody>
<tr>
<td>• Think Customer first – Make our customers successful</td>
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<tr>
<td>• Deliver to our commitment</td>
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<tr>
<td>• Think breakthrough – Think out of the box</td>
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<td>• Be first to implement</td>
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<tr>
<td>• Have a sense of urgency</td>
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<tr>
<td>• Generate results, not activity</td>
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<tr>
<th>Make Colleagues Successful</th>
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<tr>
<td>• Make our colleagues successful</td>
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<tr>
<td>• Treat our people as the most important resource in our business</td>
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<tr>
<td>• Role model desired team behaviors</td>
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<tr>
<td>• Take time to develop relationships with one another</td>
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<tr>
<td>• Be empowered – Accountable and Responsible</td>
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<tr>
<td>• Value diversity</td>
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<tr>
<td>• Have open, honest and candid dialogue</td>
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<tr>
<td>• Trust and respect one another</td>
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<tr>
<td>• Learn from success and failure</td>
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<table>
<thead>
<tr>
<th>Make Organization Successful</th>
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<tbody>
<tr>
<td>• Adopt the enterprise view</td>
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<tr>
<td>• Be aligned and unified on business objectives and values</td>
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<tr>
<td>• Lead to our vision with clarity, focus and a bias for action</td>
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<tr>
<td>• Manage with stretch objectives</td>
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<tr>
<td>• Prioritize and focus</td>
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<tr>
<td>• Drive to the bottom line – Quality, Returns &amp; Speed</td>
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recorded on the market panels, each cycle by the Facilitators. It is information for the marketing managers to consider when setting their price.

Because the market size and market growth numbers vary only slightly from cycle to cycle, the actual sales volume number is significantly influenced by the product's unit value and unit price. The purpose of this sales volume process is for the participants to discover how the marketplace drives pricing, not the producer of the product. Sales are highest when products are priced low, and unit value is high. This imitates the marketplace in which the organization is competing, and the participants often discover this through their own trial and error.

Engineering Managers draw a product “foot print” on their division triangle using the marketing information. This “footprint” represents the engineering design. The Engineering design may require Manufacturing to use certain pieces that are more costly, than if the design followed a different product loop path. In other words, the design may work great on paper, but if it is cost prohibitive for Manufacturing to make, it defeats the success of the design. This again is similar to the real world where an Engineering design could require extensive manual labor, or costly equipment, to the point that it would cost the product right out of the marketplace. Product features versus product profitability are a dilemma that forces Manufacturing and Engineering to negotiate.

Each product loop designed by Engineering Managers must include the A through D capability cards within the product loop to even have a viable product. E is optional. Engineering may choose which B - E capability cards to use. The A - E locations are fixed on the product board, but there is more than one choice for each of the letters. For instance using B1 might make a rectangular shaped box and a B2 might make a square shaped box. Marketing research becomes the driver as to which B location (box shape) has the highest product value, and therefore, which way the loop should go. These choices are designed to challenge the participants and to encourage communication, keeping Engineering dependent on market research in order to design a product with the highest product value.

Manufacturing's challenge is to match as many capability card colors (edge to edge) as possible within the product loop.
designed by Engineering. Manufacturing Managers cover the “footprint” drawn by the Engineering Managers with rainbow colored tiles, but must wait until the next cycle. Just as in “real life” it takes time to gather information and initiate design/manufacturing processes.

If marketing research is conducted in Cycle 1 the results are not available to be shared with the division until Cycle 2. If engineering makes a design change in Cycle 2 manufacturing can not complete the manufacturing re-tooling until Cycle 3. Engineering and manufacturing cannot occur simultaneously in the same cycle, just as they do not (usually) occur at the same time in the real world.

The resulting colorful product loop represents the manufacturing process portion of the product loop. Good color matches from one rainbow tile to another indicate good quality processes.

Figure 7. Engineering Manager uses Information from Marketing and Manufacturing

Figure 8. Manufacturing Manager Produces Product Loop with High Quality Matching Colors

Engineering's challenge is to design the product loop with as few capability cards as possible to keep costs low and boost product revenue. Similar to the real world, there is a cause
and effect relationship between cost and quality. Generally speaking, the more money you spend, (capability cards used), the higher the quality. The less money you spend, the poorer the quality.

Once Manufacturing understands how Engineering's design is impacting their quality, Manufacturing will begin to partner with Engineering during the design phase.

Each of the roles in each division follows a set of steps that are summarized on their game board called a “placemat”. The game board is the place where they can rest their product triangles and work out the solutions to the issues they address in each cycle. A representation of the marketing placemat is depicted in Figure 10.

In summary, each of the roles are evaluated on the following performance measures:

<table>
<thead>
<tr>
<th>Roles</th>
<th>Performance Evaluated On:</th>
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<tr>
<td>Marketing Manager</td>
<td>Division Sales Volume</td>
</tr>
<tr>
<td>Engineering Manager</td>
<td>Division Revenue</td>
</tr>
<tr>
<td>Manufacturing Manager</td>
<td>Division Quality (IQ)</td>
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Two Vice President (VP) roles oversee activity at the corporate level:

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<tr>
<th>Role</th>
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<tr>
<td>VP of Operations</td>
<td>Corporate Overhead</td>
</tr>
<tr>
<td>VP of Research and Strategy</td>
<td>Corporate Profit</td>
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Dilemmas

In the first application of the simulation the newly formed organization lacked a unique organizational culture base. Participants in the snow-card session cited this as a main factor contributing to the inability of employees to fully understand and demonstrate the overall Corporate Mission and Vision in daily operations. Additionally, numerous barriers to strategic integration, which include a lack of systems thinking, strategic collaboration, and cultural identity, exist both internally as well as within the customer base.

As cited in the discussions, these are among the many conflicts and difficulties that predominate in the new organization. In the organizational system, the tools are present to establish an appropriate balance between “polarized” management tendencies. In the schematic, these are portrayed as dilemmas to manage, rather than problems to solve for several reasons:

- Labeling a current challenge as “a problem to solve” indicates that a movement must be made from the problem toward a solution. We suggest that certain challenges and trends uncovered in the “snow card” session would be better understood as dilemmas that can be addressed through personal management processes rather than problem solving processes.

- The discussions revealed that even though management proposed initiatives in the system would institute change, there is also a need to recognize and incorporate elements of the former work culture, such as diverse thinking, individual reward structures, and individual expertise.

- Reorienting employees in several areas (e.g., cultural, product lines and technologies, organizational structures, and how success is met within the company) may be an ongoing
process. This involves experiencing and anticipating the downsides of the extremes along with the upside or benefits of adopting new ways of thinking.

Due to the integrated nature of the problem environment and the organization's objective to illustrate the contrast between both old and new values and behaviors from a learning perspective, continual movement through the dilemmas is necessary. Clusters, which are categorized in three areas, depict groups of similar issues: Cultural, Process, and Sales & Service. Therefore, the schematic serves as an additional tool to conceptually navigate through specific dilemmas.

**Theme**

The simulation creates a business environment similar to that in a real-life Tier 1 supplier organization. The simulation evolves on a day-to-day basis reflecting the lessons from the modules and the evolution of the strategies of the participants. The intent is to have the participants move from independent divisional operations that offer self-contained products and services to cooperative divisional operations that offers integrated systems. They have opportunities to adopt an Enterprise View where each unit has incentives to communicate and cooperate with other parts of the organization. On their way to experiencing The Enterprise View, the participants encounter business and cultural dilemmas, and learn to resolve these dilemmas by adopting the organization's Values and Behaviors and the Enterprise View.

The theme emphasized in Sim-I-Tri is the constructive resolution of key management dilemmas as the company evolves from a hierarchically structured parts supplier to an integrated system enterprise. This evolution places great demands on the company and employees. Development of a learning organization is critical to its success.

This evolutionary management theme is supported by the metaphor of the business as a “community” with a shared identity where individuals feel a strong commitment to work
for the good of the organization. The corporate culture is formulated around a set of archetypal values and behaviors where individual interests are superseded by the well being of the organization. It is almost as if the company is a family that places the well being of the collective over that of the individual. The company supports the culture and benefits. Sim-I-Tri shows that when employees adopt the Values and Behaviors, they also benefit.

Sim-I-Tri portrays the organization as a dynamic integrated system where all units are interconnected in a web of relationships and communication opportunities. This is because an integrated organizational system of this sort can respond more effectively to the organizational environment and “grow the business.” This “web” metaphor is all the more relevant for Sim-I-Tri because the company mission is to design and produce integrated products, many of which are based on communication technologies linking one part of the system to another.

Nevertheless, the Sim-I-Tri community is not immune to the dilemmas posed by any organization in support of business objectives. These dilemmas center on the mixed payoffs associated with open communication and cooperation. Often it is unclear whether it is worthwhile or even safe, to cooperate or share information with colleagues in other parts of the organization. For example, is it worthwhile for one part of the organization to take a loss if it benefits another part of the organization? When various units cooperate on a successful joint effort, which benefits and how will the accolades be distributed? These are core issues in a non-hierarchical enterprise-based organization. These are the types of dilemmas encountered by members of all types of organizations from families to multi-national corporations. These are the types of dilemmas that are encountered by the employees of Sim-I-Tri, Inc.

Facilitators present Sim-I-Tri to the participants through several scenario updates. The subject matter used in building the scenarios is derived from one of three major topical areas: (1) The Ten Content Modules; (2) Processes, and (3) The Enterprise Model. These three major topical areas are woven together in the Scenarios. The Scenarios can be viewed as one of the simulations's anchoring devices to the content modules; in this way, it facilitates learning and discussion of the key material.

Simulation Cycles: What Happens in the Sim-I-Tri?

The simulation is played in 7 Cycles during over a three day period. Each cycle represents 6 months in the life of Sim I Tri. The participants volunteer for the role that they play and share that role with at least one other person. After cycle 4, the participants have the option to cross train and to play another role if they choose.

In each simulation cycle the same “Steps of Play” are followed. They are:

1. Research and develop new products (40 min)
2. Calculate costs (5 min)
3. Assess performance (15 min)
4. Corporate meeting (15 min)
5. Facilitator debrief (10-20 min)

At the conclusion of each Cycle the facilitator debriefs the participants to reinforce the key learning's, and to link their experience back to work.

Because of the dynamic nature of the simulation, there is not a prescribed schedule of when things are to happen. Each group will have it's own struggles, and when it surfaces, the facilitator uses this opportunity to discuss and debrief the learnings from the struggle as it has occurred. The immediate debrief of the struggle provides for the most effective and powerful learning.

Events

Events are incidents presented to specific players at the beginning of each cycle to refocus attention on a particular aspect of the problem. Events update the scenario and represent problems that participants have to resolve in the exercise. Events systematically present increasing levels of difficulty in problem solving. They are useful in refocusing participants within their assigned role on certain aspects of the problem and allow participants to develop more sophisticated strategies as the exercise progresses.

Events simulate some of the real world dilemmas that An automotive supplier is currently experiencing. In conjunction with the content modules, they expand the information base available to participants. In all cases, participants must consider the Values and Behaviors when resolving a dilemma. The following constitute possible events in the simulation:

- The country has deregulated from the traditional power grid. This is recognized as a huge business opportunity. Other companies have been run at a cost lower than traditional utility companies. It is possible that anyone can have his or her own power generation capability.
- Market indicators have shown that there is significant demand for integrated products and services.
- A management brainstorming session produces an innovative product idea.
- Builders have read a press release on a competitor's product, which has generated ideas on improvements to the organization's existing products.
A client requests an integrated system.

Potential customers are discovered outside of the (automotive) market.

The organization competes for projects and employs the Bidding Process. Cost and price, the competition, and internal resources must be analyzed.

- Automotive supplier customer care process is deployed as part of after sales service.
- The parent company blocks the Sim-I-Tri purchasing people out of its inner process.

- The field of competition has changed. There has been a move from one captive customer to many unconstrained customers.
- There is a miscommunication of purchased items. Customers need two products that each division makes but when they are acquired, they do not fit together. (This is aimed at shifting the participants into a “super integration team”)
- An internal analysis of inventory has led to a system integration idea that will sell.
- A Request for Proposal comes out.
A communications device in a system panel must be eliminated or be made smaller in order to make the sale. (Sub-optimization lesson)

A customer complains about a product and has requested action.

A new product idea must be evaluated using the Strategic Filter Process.

A Request for Quotation is received. In a strategic review meeting with management, several analogous products must be identified and preliminary costs must be set. A price must be established and engineering requirements must be defined in order to deliver the proposal to the customer on time.

A series of difficult work problems requiring the participant to employ a variety of communication and negotiation skills are also presented in the form of events. An event dilemma represents a problem from each major substantive area. Additionally, key conflicts between real-world functional groups at the supplier company is simulated. The following dilemmas are represented in the simulation through a combination of decisions, events, and tasks and are categorized by the module or subject they are intended to address:

While initially designed for use as training simulation for industry, there are opportunities to integrate the SIM-i-TRI simulation into the College of Engineering and Computer Science (CECS) curriculum at key points. This integration can provide students a practical, “real world” experience that will both enhance their education and their ability to make a more immediate contribution to industry. The curriculum within each of the four engineering disciplines that make-up CECS (computer and information science, electrical and computer engineering, industrial and manufacturing systems engineering, and mechanical engineering) contain mostly courses in specific technical areas or on business functions from the perspective of the discipline. In addition, there are interdisciplinary design and development courses that provide students a systems perspective and the implications of decisions in this environment. There are two clear opportunities for the integration of the SIM-i-TRI simulation as part of the CECS curriculum: (1) on a broad scale in interdisciplinary courses and (2) selectively in disciplinary specific courses.
REFERENCES