Gamification & Gaming in Last Mile Applications

Opportunities for Collaborative Learning
Our team  *(Speaker Order)*

Thank you VREF for funding and engagement

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A Mental Model for “What is the Last Mile Problem”

We think the last mile problem is a "wicked problem"

<table>
<thead>
<tr>
<th>A Wicked Problem</th>
<th>Elements of the problem as seen in &quot;last mile&quot; applications</th>
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<tbody>
<tr>
<td>Theorists Horst Rittel and Melvin Webber, 1973</td>
<td>• Stakeholder complexity</td>
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<tr>
<td>1) They do not have a definitive formulation.</td>
<td>• Numerous user motivations and varying objectives:</td>
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<tr>
<td>2) They do not have a “stopping rule.” In other words, these problems</td>
<td>Consumers, Infrastructure Managers, Planners and</td>
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<tr>
<td>lack an inherent logic that signals when they are solved.</td>
<td>Regulators, and Distributors*.</td>
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<td>3) Their solutions are not true or false, only good or bad.</td>
<td>• A data problem</td>
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<td>4) There is no way to test the solution to a wicked problem.</td>
<td>• Multiple &quot;silos&quot; of data ownership and collection</td>
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<td>5) They cannot be studied through trial and error. “Every trial counts.”</td>
<td>• Forecasting problem</td>
</tr>
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<td>6) There is no end to the number of solutions or approaches to a</td>
<td>• The probability of returns, misinformation, and</td>
</tr>
<tr>
<td>wicked problem.</td>
<td>missed deliveries</td>
</tr>
<tr>
<td>7) All wicked problems are essentially unique.</td>
<td>• Operations Challenge</td>
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<td>8) Wicked problems can always be described as the symptom of other problems.</td>
<td>• Balancing costs with customer needs</td>
</tr>
<tr>
<td>9) The way a wicked problem is described determines its possible solutions.</td>
<td>• Optimization for routing that affects the delivery</td>
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<tr>
<td>10) Planners, that is those who present solutions to these problems, have no</td>
<td>efficiency</td>
</tr>
<tr>
<td>right to be wrong.</td>
<td>• Balancing public needs with system efficiency</td>
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<td></td>
<td>• Facing environmental and congestion problem while</td>
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<td>increasing delivery agility and responding to</td>
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<td>customers’ demand</td>
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Last mile is just becoming a stand-alone discipline - and needs closer understanding
A Mental Model for Gamification & Gaming (G&G)

We developed a simple “mental model” for this exercise

<table>
<thead>
<tr>
<th>Gamification</th>
<th>Gaming</th>
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</thead>
<tbody>
<tr>
<td>Using game-like attributes to encourage participation</td>
<td>Actual activities that use gamification principles</td>
</tr>
<tr>
<td>Focused on behavior / psychology particularly competition and engagement</td>
<td>Focused on building skill, strength or entertainment</td>
</tr>
<tr>
<td>Examples: Badges, Trophies, Leaderboards, point systems</td>
<td>Examples: LARP, Electronic (console) games, VR, AR, Modeling, Simulation</td>
</tr>
</tbody>
</table>
Insight: Our education methods have used Gamification for thousands of years …..

Gamification is not just about technology

….But 21st Century technology represents a unique opportunity
Working Hypotheses
(Subject to research validation)

One approach to the last mile "wicked problem" is the use of Gamification & Gaming (G&G)

- Encourages engagement and directing of behavior
- Encourages collaborative problem solving
- Allows for multiple outcomes to be tested without disproportionate risk / commitment of community resources
- Integrates technology in creative learning in the last mile education and job training
We have set ourselves these research questions:

- What role can G&G play as an educational tool, particularly as it relates to last mile problems?
- How extensively has gamification and gaming been used in last mile education?

And are pursuing these correlated lines of enquiry:

- What are the opportunities?
- What are the barriers?
- Who are the likely beneficiaries? (Education? Policy development?)
- Are broader supply chain considerations like the bullwhip effect in play?
We found examples of G&G in Supply Chain Ed

The Fresh Connection is an innovative web-based business simulation game. It engages students in turning around a manufacturer of fruit juices. In teams of 4, students will represent the functional roles of VP Purchasing, VP Operations, VP Supply Chain, and VP Sales.

Students get to run their own virtual company. Faced with declining performance, the management team must get the company back on track as quickly as possible. It is a high-pressure environment in which effective supply chain management is the key to success!

Learning objectives include:
- Forecasting
- Inventory and production control
- Supply network design
- Logistics
- Build internal teams
- Learn how to manage and optimize the carbon footprint of the supply chain
- Supply Chain Risk Management

The Supply Chain Game is an online supply network simulator. To meet different demand patterns in five regions, student teams set production and inventory control parameters, transportation choices, and add new factories and warehouses. The objective of the game is to maximize cash position. The game is designed for use in supply chain electives or core courses that emphasize supply chain management.

- Students monitor their supply network using an intuitive interface accessible through their web browser.
- Students view and download historical data to understand the effects of past decisions and to guide future decisions.
- Students choose which regions they will serve, and which method of transportation will be used.

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Credit: https://inchainge.com/business-games/tfc/
Credit: http://responsive.net/supply.html
HPC is extensively using simulation for planning and optimizing all types of marine cargo terminals and intermodal rail facilities, particularly to:

- identify bottlenecks
- determine resource requirements
- reduce development and construction cost, and quantify optimization potential
- determine energy consumption and emissions

Simio simulation and scheduling software provide the features needed to create supply chain simulation models to study and evaluate the dynamic nature of supply chains. The Simio software is a great-in-class supply chain analysis tool. With the software, you can create supply chain models that integrate both known and random constraints to optimize your plans.

Simio uses your available workflows and analyze how diverse constraints such as a pandemic or a supplier missing specified deadlines will affect your plans.
The Near Beer Game

The game is simple, you have perfect information about your customer demand. For the first 2 weeks you know your customers are going to demand 10 cases of beer per week. Then they will increase their demand to 15 cases.

Your Goal: Match your Finished Goods Inventory to Total Customer Orders and balance your production pipeline. You have 50 weeks to succeed. Return the system to equilibrium, so that 15 cases of beer are available in finished goods inventory week after week. You have 50 weeks to accomplish this objective. Accomplishing this is much harder than you might think!

How to Play

• Enter the amount of raw materials in the order field and click "order".
• It takes 1 week to order the materials, 1 week for your order to ship, & 1 week to brew the beer. After these 3 weeks, you will have beer to sell to your customers.
• Try your best to keep the Total Customer Orders & the Finished Goods Inventory in balance. You don't want excess inventory, or to have unfilled orders.
• If you do not meet the customer demand for a week, the unfilled orders will carry forward to the next week as demand.
We'd love your input.

Please participate from home!

https://www.surveymonkey.com/r/GG-Survey-INUF22

OR

Scan the QR code to access the survey
Next Steps...

• White Paper
• Convene Hackathon / Workshop – include both G&G and Freight professionals
• Community pilot using G&G
Thank you & please reach out

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Some examples of G&G we found:

- https://www.reddit.com/r/BaseBuildingGames/comments/mbn96j/logisticsupply_chain_games/
- http://www2.open.ac.uk/openlearn/supply-chain/index.html
- Example: https://www.anylogistix.com/features/supply-chain-simulation/
- Example: https://www.anylogic.com/supply-chains/ (go down to multiple)
- https://forio.com/app/showcase/near-beer-game/ (demo)
- http://responsive.net/supply.html
- http://responsive.net/ebeer.html
- https://www.hamburgportconsulting.com/our-expertise/simulation