OPTIMIZING THE LONG -TERM NET VOYAGE REVENUE OF YOUR FLEET

Problem

Inter Barge a first class - **Waterway Operators**, affiliated to SCF Marine part of Seacor Holding Group, has been operating freight along the HPP (Hidrovia Parana Paraguay-South America) Waterway in a dedicated mode. Both Push boats and Barges are pre assigned to contracts (demand). During certain seasons of the year, these resources are free of contract commitment and have free convoy capacity in certain trips.
Their challenge is to use this free capacity in a Fleeting mode**, maximizing** their **Net Voyage Revenue** and deliver the committed contracts freights choosing the best convoy sizes and resources allocation.

Goals in mind:

How to schedule all their operations threw this new Fleeting Mode, where there is a complete independence between push boats and barges. And including pre assigned contracts within the system. Each push boat decides, in an intelligent way, when arriving at a port or fleeting point, which is the best route to follow, and which are the barges with which build up the temporary convoys.

Project Goals

- **Maximize** the **Net Voyage Revenue** of the company equipment and resources threw a planning tool (deciding which trips to do, which contracts to commit, where to allocate push boats and barges, and more)
- **Evaluate the risk** of new Push Boats and Barges acquisition
- Use it as **a tool to identify the revenues and negotiate the contract freight price**
- Use it as a **tool to Plan the whole operation** in a short and long term basis.

SOLUTION

This model has been designed with **Anylogic** using both discrete events and agent based methodologies. Pushboats and Barges navigate along the rivers, stopping in each node or port, and deciding when to use it as fleeting point, Push boats or Barges will take decisions, according to the geographical place were the resource is located in the moment the decision has to be taken. Time Charter Equivalent will be calculated for each active/available Contracts offer and of Convoy configuration, considering all possible restrictions, and the model will choose the best option.

The input data includes:

- Available waterway demand and annual seasons (contracts, price, fees, and more)
- Clients Fleet: push boats and barges (type, intake, speed, draft, power, bunker consumption)
- River and ports specifications (water levels, loading and unloading capabilities and rates for each product, and more)
- Distance between ports and fleeting points.
- Operation Costs costs and Delays in ports of fleet usage

The system considers the following:

- Restricted routes/nodes for Push boats due to water level or Flag
- Push boats pulling capacity while upstream or downstream
- Push boats speed while upstream or downstream, loaded or unloaded
- Bunker consumption
- Contracts weekly balance and season
- Pre assigned fleet
- Barges type and intake, according to products cubic factor, and weekly water level
- Line up times
- Shifting times
- Loading and Unloading times

OUTCOME

The decision support model will show users, which will be the expected Net Voyage Revenue for the input resources and waterways freight transportation demand.

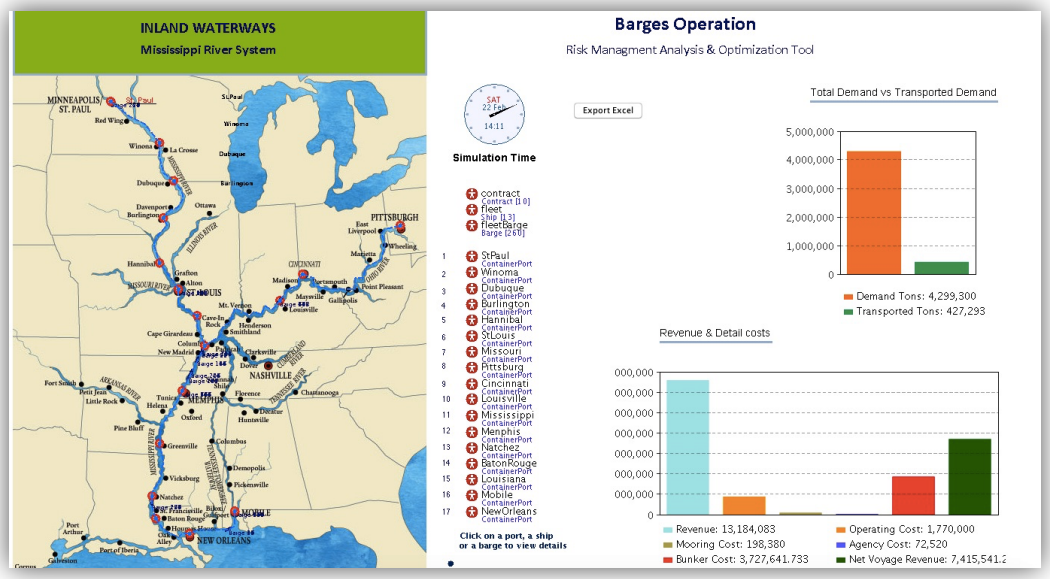
Users will be provided with a group of key indicators such as Tons delivered per contract, Navigating Times and Costs, Barges and Push boats Usage; Mooring and Waiting times in each port, Bunker consumption. These information allows users to analyze the best options to be chosen.

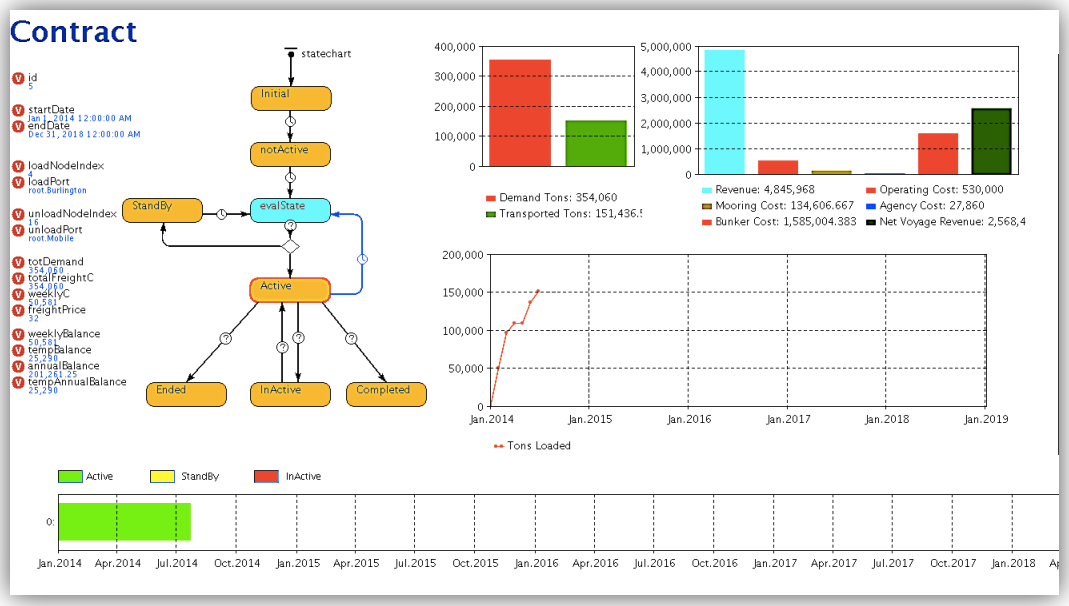
It also allows to plan routes for Push boats, and Convoys in a short and long term basis.

Output shows Push boats occupancy along the year, locations and drifts of resources from one contract to another. Output is also exported to excel, to allow additional reporting.

The simulation model runs in less than 300 seconds, considering around 250 external variables, within a 5 year time frame, with multiple scenario options, allowing users to share inputs, outputs and scenario parameters used.

Because of the way the model has been designed, where most of the input and scenarios are managed dynamically by the user, the solution can easily be adapted to changes and/or new requirements.





Barges & PushBoats Detail Activity

Ports		Pushboats				Barges					
Code	Name	Nav To	Arrived	Departed	In Port	Nav To	Arrived	Departed	In Port	Loading	Unloading
1	St.Paul	0	0	0	0	0	20	0	20	0	0
2	Winona	0	20	20	0	0	343	310	33	0	0
3	Dubuque	0	49	49	0	0	791	777	14	0	0
4	Burlington	0	74	74	0	0	1,205	1,196	9	0	0
5	Hannibal	0	108	108	0	0	1,823	1,819	4	0	0
6	StLouis	1	125	124	1	19	2,164	2,137	27	0	0
7	Missouri	1	186	185	1	20	3,001	3,001	0	0	0
8	Pittsburg	0	0	0	0	0	0	0	0	0	0
9	D.Cincinnati	0	0	0	0	0	0	0	0	0	0
10	Louisville	0	49	49	0	0	724	722	2	0	0
11	Mississippi	2	337	334	3	28	5,264	5,226	38	0	0
12	Menphis	0	326	325	1	0	5,198	5,189	9	0	9
13	Natchez	0	319	319	0	0	5,113	5,113	0	0	0
14	BatonRouge	0	298	295	3	0	4,795	4,758	37	0	23
15	Louisiana	0	278	278	0	0	4,420	4,420	0	0	0
16	Mobile	0	141	141	0	0	2,230	2,230	0	0	0
17	NewOrleans	0	281	281	0	0	4,420	4,420	0	0	0
	Total:	13	4		9	260	67		193	0	32
	Max		12				196				