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Space Elevator Architecture

Architecture Note #31

Space Elevator Self Awareness An Architecture Adjunct

The Galactic Harbour will have lots of pieces. Some will be part of the Architecture's Space Elevator Systems, some will be the cargo on its way, and some of the pieces will be neither.

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Personal Prolog

This is an Architecture Note. It is the opinion of the Chief Architect. It represents an effort to document ongoing science and engineering discussions. It is one of many to be published over time. Most importantly, it is a sincere effort to be the diary, or the chronicle, of the multitude of our technical considerations as we progress; along the pathway developing the Space Elevator.

Michael A. Fitzgerald

The Galactic Harbour has lots of pieces.

I live about a mile from the western portion of the Port of Los Angeles. It is often called the Port of LA / Long Beach, and together they form one of the biggest port complexes in the world. On occasion, I drive over to Long Beach; about 6 or 7 miles east. As I go, I pass by tens of thousands of shipping containers, thousands of employees, hundreds of vehicles, dozens of flatbed train cars, and probably a lot more stuff I don't see.

The cargo, the contents of those containers, is destined for all sorts of places; places as far away as Omaha and St. Louis. Most products must move efficiently; retaining their value; e. g. the fresh blueberries I had with my yogurt this morning came through the port from Chile. Beyond all that, various law enforcement entities see the huge port complex within their jurisdiction.

The port is quite a place and is covered by a range of sensor systems helping to manage the transportation activity and law enforcement efforts. The Galactic Harbour needs to exceed that surveillance chore. All the objects in the Galactic Harbour will be watched by sensors orbiting by. All will be "tagged" with RF identification chips, and will be able to signal a response to a query. The two way signal content will likely be encrypted, location and ownership will be checked and rechecked. The entire population of all those pieces within the Galactic Harbour will be under positive control.

Excess population pieces will be tracked down, a threat will be assessed, and the pieces will be snared or eliminated; as needed. (This was discussed broadly in Architecture Note #25 – Debris Mitigation).

Awareness and Surveillance within the Supply Chain.

The Galactic Harbour's overall self-awareness capability must certify that every one of its components is operating safely and effectively in the space environment, and executing at the requisite performance level. It is also necessary that dangerous and nefarious incidents are deterred; indeed prevented. To accomplish that objective, a "reach back awareness" program is mandatory; reaching back to manufacturers. Client cargo items must be produced, packaged, and installed aboard the Climber with full surety that Elevator operations will proceed without interruption. Our concept baseline view is that 14 Climbers are in route somewhere, and none of the 14 cargo payloads can cause interruption of the flow. The contents of all Climbers are actively monitored; with the monitor data provided to the Operations Center aboard the Earth Port FOP. Each of the 14 Climbers will have a cargo pilot / cargo manager charged with maintaining positive awareness; ensuring the cargo gets to its destination safely and on time.

The Supply Chain source items arrive at the Access City for primary certification; then organized and sent to the Earth Port FOP

Items arrive from the manufactures at the Access City and are certified for travel and assigned to a soon departing Climber. Access City efforts include acceptance procedures to ensure that the Galactic Harbour is receiving material from certified sources. Two cargo types are evident. Material designated for use within the Space Elevator Transportation System (e.g. Elevator spare parts and consumables); and client's cargo. Extensive storage is not available in the Regions above. Thus, the cargo items are part of a responsive "in-time" service / delivery structure. Losing an item or obstructing the flow will be abhorred!

The Earth Port certifies receipt of each cargo item.

The Earth Port's Floating Operations Platform (FOP) is the entry point to the Galactic Harbor. More than simple transshipment, the FOP arranges the cargo properly for insertion into the Climber; probably on a pallet of some sort. The pallet secures cargo from possible shock, movement, or environmental stress, and also attaches the needed monitoring devices.

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Information from each climber will be transmitted (perhaps even down the Tether) to the Primary and Backup Operations Centers.

Surveillance of the Climber.

Surveillance of the Climber will be at the core of the Galactic Harbour's Self Awareness activity. In addition to the information flowing from the internals of the Climber, surveillance systems will be orbiting by collecting location "truth" of the Climber's progress up the Tether. Imagine each Climber having passive and active cognition techniques; like an encoded license plate and an encrypted signal/response system. It is also expected that the Climber will scan the Tether for wear and tear and report that to Operations.

Surveillance of the Tether.

Sustaining the Tether is kind of important. However good as it may be, it will not be invincible. We certainly hope for gradual operations performance variance vice a catastrophic failure. (Once again review Architecture Note #25). I expect our Tether will have some stress revealing adornment, like a purple badge that will record the stress it senses as the Climber approaches, and it reads out to the Climber going by. Perhaps the badge could be interrogated by the signals collection sensors orbiting near.

Surveillance of UFO's.

Much of the GEO Region will operate on or near the busy highway we call the geosynchronous belt. In addition, those asteroid close approaches we have been reading about makes one wonder. I assume that nearly all of this UFO traffic will be within the responsibility of the Space Force then. But to some degree or another, the Galactic Harbour will encounter UFO's; if only for a short time; minutes to hours. In the midst of that hesitancy, a specific, practiced action protocol will be needed. An action set that – for the moment - is "to be determined."

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In closing.

Galactic Harbour Self Awareness & Situational Awareness Adjunct. That is quite a mouthful. We will get help, that is what we mean by Architecture Adjuncts. Other systems, then operational, will help us.

I have talked about two Architecture Adjuncts; Debris Mitigation and Self Awareness & Situational Awareness. I will talk about the third one soon – “Client Services”. Keep those cards and letters coming.

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