**Introduction**

a.      Societal Problem

                                                              i.      Relatively new to this area – light rail – expanding to other local areas is expensive with perceived little benefit

                                                            ii.      inefficient or nonexistent communication

                                                          iii.      loss of riders due to frustration or confusion.

                                                           iv.      loss of revenue for business

                                                             v.      loss of revenue for HRT

                                                           vi.      little return on tax dollars to riders or businesses

                                                         vii.      ineffective train utilization and schedule

b.      Current ITS

                                                              i.      modular system for enabling easy communication internet/cellphone based

                                                            ii.      real time info – of ridership, train locations, train related issues

                                                          iii.      alerts and rider feedback

                                                           iv.      trending & prediction of ridership demand based upon time of day or associated events

                                                             v.       advertising for local business related to tide stops

                                                           vi.      prototype approach to above

**2.0.            Current ITS Product Description**

a.      Accessible

                                                              i.      Mobile , web based, and onsite

                                                            ii.      Inform and assist riders

                                                          iii.      Allow businesses to update ads

                                                           iv.      Transit authority monitoring and prediction

b.      Real-time

                                                              i.      Provide valuable information to transit authority

                                                            ii.      Aid rider decisions

                                                          iii.      Ads targeted based on location.

c.       Valuable

                                                              i.      Saves riders time

                                                            ii.      Saves transit authority money

                                                          iii.      Generates customers for businesses

**2.1.      Key Product Features and Capabilities**

a.      Transit Authority web  interface

b.      Business and Event management web interface and app

c.       Rider web interface and mobile app

d.      Real time train tracking

e.      Real time passenger counting

f.        Customized reports for  Transit Authorities

g.      Ridership Trending and Forecasting

**2.2.            Major Components (Hardware/Software)**

                                                              i.      Overview of Current RWP MFCD

                                                            ii.      Software Components

1.      Embedded On-Board Application

2.      Database

3.      Decision Engine

4.      Web Application Engine

5.      Mobile/Kiosk Android Application

                                                          iii.      Hardware Components

1.      On-Board Hardware

2.      Production Server

3.      Development Systems

                                                           iv.      Algorithms

1.      Embedded Reporting Agent

2.      DE Machine Learning

a.      Training Set Generation

b.      Prediction Request Handler

c.       Intelligent Routing Algorithm

3.      Reporting and Syndication w/ Google API

4.      WAE Request Handling

**2.3              Target Market/Customer Base**

a.      Initial Customer: HRT

                                                              i.      Benefits

1.      Economic boost

2.      Easy-to-access information

3.      2-way communications

                                                            ii.      Current size

                                                          iii.      Future expansion

                                                           iv.      Trial run for system

* 1. Future Market: New Light Rail Systems

                                                              i.      Focus: areas experiencing growth

1.      Defining characteristics

2.      Benefits

                                                            ii.      System scalability/modularity

                                                          iii.      Market size

1.      US – current

2.      US – future

3.      Europe

4.      Global

**3.      Current ITS Prototype Description**

a.      Product Objective

                                                              i.      Provide valuable information to transit authority

                                                            ii.      Aid riders make effective decisions based off our information

                                                          iii.      Location based ad targets

b.      End-User Interfaces

                                                              i.      Alerts and informs riders of trains, capacity, and events and all related to.

                                                            ii.      Businesses can promote themselves and their events with ease

                                                          iii.      Transit authority monitoring and prediction

                                                           iv.      Mobile, web, and on-site interfaces

c.       Benefits

                                                              i.      Saves time

                                                            ii.      Saves money

                                                          iii.      Makes customers – tax revenue for cities

**3.1.            Prototype Functional Goals and Objectives**

a.      Display functionality of Transit Authority web interface

b.      Monitoring of trains and ridership - simulations

c.       Accessing of reports

d.      Display functionality of Business and Event management web interface  and app

e.      Posting of and event or business advertisement – preloaded data also

f.        Display functionality of rider web interface and mobile app

g.      Purchasing  ticket – simulation just to queue up the ridership potential

h.      Viewing train location and current capacity - ability to modify on the fly

i.        Simulate real time train tracking – ability to modify on the fly

j.        Simulate real time passenger counting - ability to modify on the fly

k.       Simulate customized reporting using mock up rider data. – prepopulated data

l.        Simulate ridership trending and forecasting using mock up data

**3.2.            Prototype Architecture (Hardware/Software)**

a.      Overview of Current ITS RWP MFCD

b.      Software Components

                                                              i.      Embedded On-Board Application

                                                            ii.      Database

                                                          iii.      Decision Engine

                                                           iv.      Web Application Engine

                                                             v.      Mobile Android Application

c.       Hardware Components

                                                              i.      Production Server

                                                            ii.      Development Systems

d.      Algorithms

                                                              i.      Embedded Reporting Agent

                                                            ii.      DE Machine Learning

1.      Training Set Generation

2.      Prediction Request Handler

                                                          iii.      Reporting and Syndication w/ Google API

                                                           iv.      WAE Request Management

**3.3.            Prototype Features and Capabilities**

                                    a.            Major Features

i.        Local businesses/attractions

ii.      Search function

iii.    User favorites (recommendations?)

iv.     Station association

                                    b.            Event calendar

i.        Upcoming events

ii.      User favorites

iii.    Station association

                                     c.            Business advertising

i.        Business interface

                                                                                          1.      Generate advertisement

                                                                                          2.      Impressions/clicks report

                                                                                          3.      Station report

ii.      Station association

iii.    Feedback

                                                                                          1.      Easy-to-use submission

                                                                                          2.      HRT backend report

iv.     Trend Analysis

                                                                                          1.      Station trends over time

                                                                                          2.      Event prediction – ridership need – calendar based??

                                                                                          3.      HRT backend report

                                    d.            Risk mitigation

i.        Data latency

                                                                                          1.      Timestamps

                                                                                          2.      Simulate delayed data

ii.      Data accuracy

                                                                                          1.      Diagnostic tests

                                                                                          2.      Simulate bad data

iii.    Realistic model

                                                                                          1.      Real world based data input

**3.4.             Prototype challenges and risk**

a.      Risks

b.      Realistic representation of the simulated solutions

                                                              i.      Simulated Hardware

                                                            ii.      Simulated Software

c.       Meeting Development Requirements

                                                              i.      Development Specifications

                                                            ii.       Development Time frame

d.      Completing development of Innovative parts of projects

                                                              i.      Integration between hrt and local businesses

                                                            ii.      Real time rider feedback

                                                          iii.      Real time GTFS

e.      Developing algorithms required for prototype Demonstration

                                                              i.      Learning algorithm for trending

                                                            ii.      HRT Backend

                                                          iii.      Business backend

                                                           iv.      Rider Backend

**A.     Glossary**

**B.      References**