

# Technology for transit

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1/14/2010 for HackPittsburgh

# Overview

# Overview

- Problem domain

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- Problem domain
- Survey of open source tools

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- What's missing

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- Political issues (Pittsburgh)
- Experimentation



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  - My CMU CivE senior seminar project
  - I still have the code

# Background, Biases



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# Why tech for transit

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- Make best use of available service

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- Make best use of available service
  - Funding cuts reduce what's available
  - Fewer “one seat rides”
  - Unfamiliar can be intimidating

# Why tech for transit

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- Make service accessible

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- Make service accessible
  - Help new riders find needed service



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- Make service accessible
  - Help new riders find needed service
  - Help visitors see what's available

# Why tech for transit

- Make service accessible
  - Help new riders find needed service
  - Help visitors see what's available
  - Find open wheelchair or bike slots

# Classes of problem

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- What's possible generally

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- What's possible generally
  - Schedules

# Classes of problem

- What's possible generally
  - Schedules
  - Route planning

# Classes of problem

- What's possible generally
  - Schedules
  - Route planning
  - Service features

# Classes of problem



# Classes of problem

- What's possible now

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- What's possible now
- Current schedule

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- What's possible now
  - Current schedule
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  - Delays

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- What's possible now
  - Current schedule
  - Detours
  - Delays
  - Resource availability

# Tools

# Tools

- Trip planner

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- Trip planner
  - The most basic needed tool



# Tools

- Trip planner
  - The most basic needed tool
    - Trip data

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  - The most basic needed tool
    - Trip data
      - Google Transit Feed

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    - Trip data
      - Google Transit Feed
      - Scraped schedules
    - Map data
      - OpenStreetMap

# Schedule data sourcing

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  - <http://code.google.com/p/googletransitdatafeed/>

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- GoogleTransitDataFeed project includes simple tools to:
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  - manipulate (TransitFeed)
  - visualize (ScheduleViewer)

# Trip planning



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- Graphserver

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  - Example: <http://www.walkscore.com/transit-map.php>

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  - Minimal dependencies

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  - C++, Python, Boost, SWIG
  - Development stopped
  - Simple to deploy
  - Minimal dependencies
  - Small footprint

# Trip planning



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- gosmore

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- pgRouting

# Mapping

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  - C++ vector mapping toolkit
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- OpenLayers, GeoServer, et al

# Schedule publishing

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  - Contributed by a transit agency (TriMet)

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  - Contributed by a transit agency (TriMet)
  - Java, open source

# Mobile Apps



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  - GTFS data source

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- PDXBus
  - <http://www.teleportaloo.org/pdxbus/src/>
  - Obj-C iOS
  - Some PDX-specific data formats

# What's missing

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- Real-time arrival data API

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  - Not part of GTFS

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  - Not part of GTFS
  - Usually (system-specific) XML via HTTP
  - APTA TCIP \*might\* help
- Detour/route update API
  - A street closes. Where is my bus?



# What's missing

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- \*Low\* tech solutions

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- \*Low\* tech solutions
  - Not everyone has a smart phone

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- Mode merging

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  - Bike routing data

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  - Bike routing data
  - Pedestrian routing data

# Technical Issues

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- Real time tracking



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  - Often shipped on new buses, not enabled

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- Requires hardware
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  - Backend server needed to share

# Technical Issues

# Technical Issues

- Detours

# Technical Issues

- Detours
  - Just needs deployed tools

# Technical Issues

- Detours
  - Just needs deployed tools
    - This data is already shared

# Political Issues



# Political Issues

- Lack of Port Authority staff time to spend on improvements

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- Lack of money to license patents

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- Lack of money to license patents
- Union opposition to real-time tracking

# Political Issues - Money

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- Grant writing to fund new projects

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  - Requires ally inside Port Authority

# Political Issues - Patents

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- NextBus and ArrivalStar patents



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  - But who can afford the attorneys to find out?

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- Further details: transit-developers list, 1/4/2010

# Political Issues - Unions

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- A hot potato

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  - Recent Red Line (Beechview light rail) delays

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  - Would likely be a contract point of contention

# Political Issues - Unions

- A hot potato
  - Recent Red Line (Beechview light rail) delays
  - Would likely be a contract point of contention
  - Which is worse in “no money” world



# Political Issues

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- Workarounds

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- Aggregate “opt in” data from smartphone users

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  - Unreliable, incomplete

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  - License real time location data from cellular providers

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  - Aggregate “opt in” data from smartphone users
    - Unreliable, incomplete
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  - Just experiment for now

# Experimentation

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- Building blocks



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  - Linux or FreeBSD

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- Linux or FreeBSD
  - Something with a decent set of prebuilt or buildable tools
  - Python, Ruby, web server

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# Experimentation

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- OpenStreetMap

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  - Best free source of street and trail data

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- OpenStreetMap
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  - But some attributes missing

# Experimentation

- OpenStreetMap
  - Best free source of street and trail data
  - But some attributes missing
  - Pick likely “test” routes and verify data

# Experimentation

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- Real-time tracking

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  - Define minimal tracking format



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# Experimentation

- Real-time tracking
  - Define minimal tracking format
  - Build minimal gumband tracker
    - But how do you tell it what trip info to transmit?
    - Likely need intermediate server to rewrite to XML

# Experimentation

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- Detour info

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- Detour info
  - Screen-scrape Port Authority site

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- Detour info
  - Screen-scrape Port Authority site
  - If we get serious, I have limited contacts there.

# Resources



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- [code.google.com/p/fivepoints](https://code.google.com/p/fivepoints)

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