



**CONNECTIONS 2040 CHOICES & VOICES**  
CREATE YOUR VISION FOR GREATER PHILADELPHIA



# CHOICES & VOICES: WEB TECHNOLOGY & CROWDSOURCING

Strategies for  
Successful  
Information  
Interaction

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## OVERVIEW

*Connections 2040: Choices & Voices* allows you to participate in developing a vision for growth and development in Greater Philadelphia between now and 2040.

Identify your preferred development pattern, and then select regional funding levels and major transportation projects that you would like to see happen over the next 27 years.

This application is crowdsourced, so you'll be able to compare your scenario to the vision created by all other participants.

## REASONS

- **Education**
  - Show the relationship between transportation funding, maintenance, and improvement
  - Provide examples on how to improve transportation within the region
  - Explain the trade-offs between increasing funding and increasing travel costs
- **Crowdsourcing data**
  - Collect information on preferences for regional transportation options
  - Aggregate data to give insight into developing the long range plan for the region

# ALTERNATIVE PRODUCTS

## Denver Region MetroQuest

### ■ Pros

- Easy to use
- Successful
- Nice graphical interface

### ■ Cons

- Does not discuss funding sources or shortfalls (unrealistic scenarios)
- Not accessible on all devices

## Spokane Regional Transportation Vision

### ■ Pros

- Comprehensive
- Realistic budgets and funding

### ■ Cons

- Challenging for average user
- Lack of graphics
- Does not explain how it will impact the household

## LIBRARIES AND FRAMEWORKS

- Bootstrap 2.0 by Twitter
- Knockout 2.1
- Google Analytics

**Bootstrap**

**Knockout.**

**Google Analytics**



# BOOTSTRAP

- Created by Twitter developers
- Provides default layouts, styles, and components
- Uses 12-column responsive grid to fit to small screens
- Includes easy-to-use JQuery plugins
- Good for fast development and supported by all browsers back to IE7



## GUI DESIGN DECISIONS

- Creative visualizations
- Simple to use, simple to understand
- Use graphics to illustrate concepts
- Large, prominent Next button
- Condense additional information using popovers
- Improvements to Transportation Funding page
- Use a dynamic sliding bar for greater control over funding amounts
- Added share to social media buttons to personalize marketing

## KNOCKOUT

- Dynamic controls the user interface
- Provides the missing link between static HTML and dynamic data
- Uses Model-View-ViewModel (MVVM) pattern developed by Microsoft for event-driven programming
  - Model – either an object or a data layer
  - View – the user interface that provides buttons, information, and other controls
  - View model – the bridge between the two layers above, taking the data from the model and providing the view with the information it needs to display to the user



```

54 public void get()
55 {
56     DataView rec = GetData();
57     outputs.Add("db",rec.Count);
58     for(int i = 0; i<rec.Count;i++)
59     {
60         Dictionary<string, object> arr = new Dictionary<string, object>();
61         for (int j = 0; j<rec[i].Row.ItemArray.Length; j++)
62         {
63             arr.Add(rec.ToTable().Columns[j].ToString(), rec[i][j]);
64         }
65         outputs.Add("rows", arr);
66     }
67 }
68
69 public DataView GetData()
70 {
71     OleDbConnection con = new OleDbConnection();
72     con.ConnectionString = path;
73
74     OleDbCommand com = new OleDbCommand();
75     com.Connection = con;
76     com.CommandText = "Select * From \"NEWTABLE\""+buildWhere(whereFields, com);
77     com.CommandType = CommandType.Text;
78
79     DataSet ds = new DataSet();
80     OleDbDataAdapter ad = new OleDbDataAdapter();
81     ad.SelectCommand = com;
82
83     con.Open();
84     ad.Fill(ds);
85     con.Close();
86
87     sql = com.CommandText;
88     return ds.Tables[0].DefaultView;
89 }
90
91 public string buildWhere(string[] fields, OleDbCommand com)
92 {
93     string s1 = " WHERE ";
94     List<string> s2 = new List<string>();
95     Regex rgx = new Regex("[^a-zA-Z0-9 -]");
96     //List<string> str = new List<string>();
97     foreach (string field in fields)
98     {
99         s2.Add(field+" = ?");
100         OleDbParameter parameter = com.Parameters.Add("@InputParm", OleDbType.VarChar,
101             string val = rgx.Replace(field, String.Empty).ToLower());
102         if (p.Get(val) != null)
103         {
104             parameter.Value = p.Get(field);
105         }

```

## MODEL

either a  
business object  
or a data layer

Server side  
technology (C#,  
Oracle)

```
1309         Minimal maintenance
1310     </div>
1311     <div class="span3" style="cursor:pointer" data-bind="click: function(model, ev)
1312         Maintain current funding levels, current conditions worsen
1313     </div>
1314     <div class="span3" style="cursor:pointer" data-bind="click: function(model, ev)
1315         Maintain current conditions
1316     </div>
1317     <div class="span3" style="cursor:pointer" data-bind="click: function(model, ev)
1318         Achieve and maintain a state-of-good repair
1319     </div>
1320
1321 </div>
1322 </div>
1323 </div></div>
1324 <div class="clear"></div>
1325
1326 <h3>Operational Improvements</h3>
1327 <p><b>What system enhancement projects would you like to invest in?</b>
1328 </p>
1329 <label>Intelligent Transportation System (ITS) improvements such as variable message s:
1330 </label>
1331 <label class="indent"><input type="checkbox" value="majorITS" name="enhance" data-bind:
1332 <label class="indent"><input type="checkbox" value="regionalITS" name="enhance" data-b:
1333 <!--<label><input type="checkbox" value="CompleteStreets" name="enhance" data-bind="ch
1334 <label><input type="checkbox" value="RTN" name="enhance" data-bind="checked: enhance" ,
1335 <label data-content="These are transit service enhancements to improve the speed and r
1336 <label>Increase Transit service frequency:
1337 </label>
1338 <label class="indent"><input type="checkbox" value="incTransit10" name="enhance" data-l
1339 <label class="indent"><input type="checkbox" value="incTransit25" name="enhance" data-l
1340 <label><input type="checkbox" value="modernTransit" name="enhance" data-bind="checked:
1341
1342 <h3>System Expansion</h3>
1343 <p><b>Which major new projects would you like to invest in?</b>
1344 </p>
1345
1346 <label><input type="checkbox" value="majorHighway" name="newdev" data-bind="checked: ne
1347     <ul class="indent">
1348         <li>new interchange at I-95 and PA Turnpike;</li>
1349         <li>I-295 at NJ 38 add missing movements;</li>
1350         <li>I-295 at I-76/NJ 42 add missing movements;</li>
1351         <li>I-295 Direct Connect through I-76/NJ 42 Interchange;</li>
1352         <li>extend Lafayette Street in Norristown, Pennsylvania to create new PA Turnpike :
1353     </ul>
1354 </label>
1355 <label><input type="checkbox" value="regionalHighway" name="newdev" data-bind="checked
1356     <ul class="indent">
1357         <li>US 202 - widening from West Chester to the Delaware state line; and widening ar
1358         <li>US 422 mainline widening from US 202 to PA 363;</li>
1359         <li>US 30 Coatesville-Downingtown Bypass - widening from Business 30/Exton Bypass 1
1360         <li>US 322 - widening from US 1 to I-95; and<li>
1361         <li>US 1 - Penn's Neck area - widening and construction of new connector road </li>
```



## VIEW

the user interface that provides buttons, information, and other controls

Client side technology (HTML5, CSS)

```

527     GHG: ko.observable(7.6).extend({numeric:{decimals:1}})
528   });
529
530   window.pollforupdates = ko.computed(function() {
531     var $this = this;
532     $.getJSON('script.aspx', {scenario:this.housing(),density:this.dev(),'tax option'
533       $this.data(data);
534     });
535   },viewModel).extend({throttle:1});
536
537   ko.computed(function() {
538     $.getJSON('script.aspx', {avg:true}, function(data) {
539       var data = data.rows[0];
540       //console.log(data);
541       for (indicator in data) {
542         avgModel[indicator](data[indicator]);
543       }
544     });
545   }, avgModel);
546
547   ko.computed(function() {
548     this.housing();
549     sizeGallery();
550   },viewModel);
551
552   ko.computed(function() {
553
554     var $this = this;
555     var data = $this.data();
556     if (!data.hasOwnProperty('rows')) return;
557     if (data.rows[0]['Conc'] == '2010H0') return;
558     $this.Acres(data.rows[0]['total acres developed']);
559     $this.VMT(data.rows[0]['driving']*$this.peakVMTFactor());
560     //B43*C43*D43*C90
561     $this.peakVMT(data.rows[0]['daily veh']*data.rows[0]['ave veh']*data.rows[0]['per
562     //(VLOOKUP('Const Eq Mult'!C2,Table!$F$3:$T$221,6,0)+'Const Eq Mult'!C38)*Const
563     $this.Transit((data.rows[0]['transit']+$this.newRiders())*$this.transitFactor());
564     $this.BikePedRaw(data.rows[0]['nonmotorized trips']);
565     //'Const Eq Mult'!B31+'Const Eq Mult'!C31+(((Questions!L29+1.7786)/5.8452)*L14*'C
566     $this.Costs(data.rows[0]['residential energy']+data.rows[0]['vehicle ownership co
567     //100000/POP2040*$this.VMT.raw()*POP2040*0.000000101
568     $this.Safety($this.VMT.raw()*0.00097);//data.rows[0]['Road Safety']);
569     $this.GHGFactor(data.rows[0]['residential']);
570     if (data.rows[0]['conc'] == '2010H0') {
571       $this.is2010(true);
572       window.values2010 = data;
573       //window.model2010 = toObject($this);
574     }
575     else {$this.is2010(false);}
576   },viewModel);
577
578   viewModel.enhance.push = function(newValue) {
579     if (newValue == 'majorITS') this.enhance.remove('regionalITS');

```

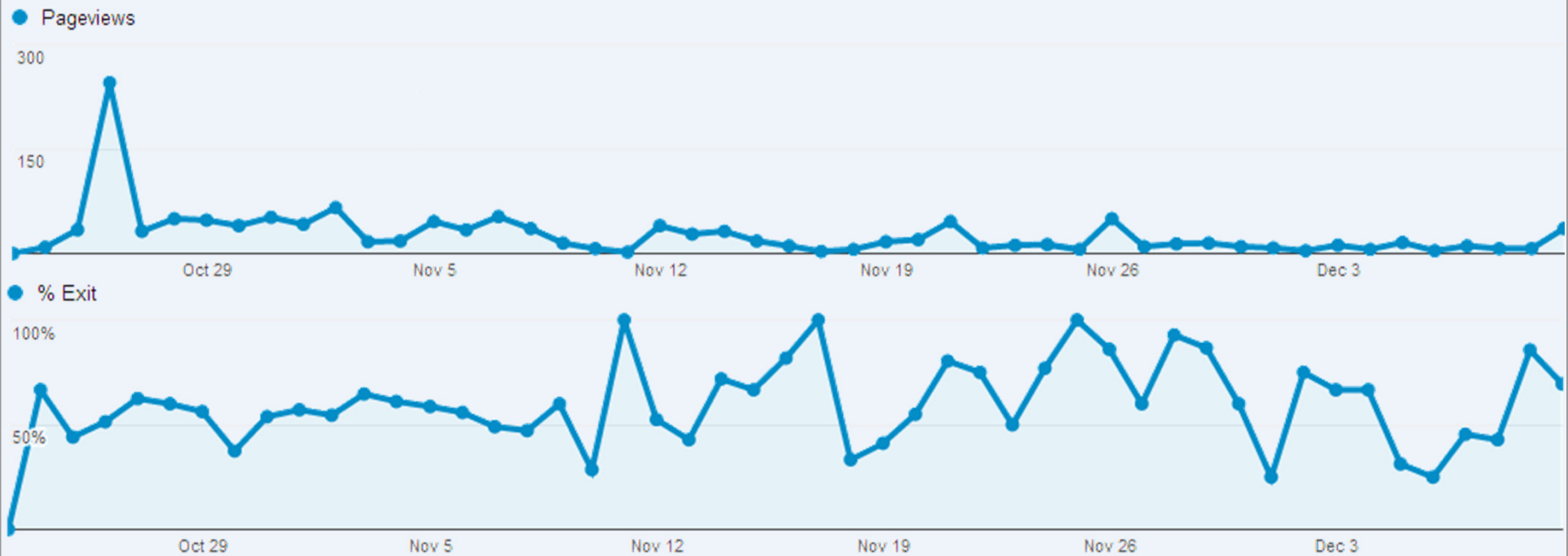
## VIEWMODEL

the bridge between the two layers above, taking the data from the model and providing the view with the information it needs to display to the user

Client side technology (JavaScript using Knockout and JQuery)

# GOOGLE ANALYTICS

- Comprehensive traffic analysis and reporting
- Monitor traffic sources to evaluate campaign effectiveness
- Compare visits to app submissions: completion ratio
- Track sharing via social media
- Find out what users do next on the website





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## CROWDSOURCING DATA

ACRES	VMT	BIKEPED	TRANSIT	ROADCON	TRANSITCON	CONGESTION	SAFETY	COSTS	GHG
798400	6219.67624710875	103.73656742700001	88.28099527323693	0.30818391724658034	0.288373	13.158272782926952	6.033085959695488	11881.807575442974	6.848253049139981
793000	7214.436664858071	91.7563701726	84.46500783497171	0.574963965338226	0.1058	27.713340756904763	6.998003564912329	13681.478038008716	7.347412218173199
814000	7552.728505998731	89.36631816	66.4335389113218	0.4883761463951685	0.4949079999999999	30.154498734993947	7.326146650818769	13591.85911610015	7.537051930817414
793000	7609.3218031439565	91.6301682183	63.67803980471592	0.2945195755461291	0.398925	26.700855142594957	7.685415021175396	12935.952525544822	7.553533586945072
798400	7243.493985039831	91.55290151140001	83.78795208330811	0.47838603310182926	0.1058	25.294995498702793	7.026189165488637	13399.98744041115	7.364939897003227
798400	6224.3701149655535	102.7094727	87.70906464405932	0.31400748365604236	0.2699249999999999	14.109359692277298	6.037639011516587	11900.667454752682	6.8502907380958975
793000	7248.357427148348	92.5929645856	79.64434662591803	0.47838603310182926	0.4028529999999999	17.057497958262385	7.030906704333898	13171.156689676987	7.370230325401226
798400	7557.617642078474	90.28772511	66.41998093577988	0.3567507471071767	0.3414129999999999	30.163013202426914	7.33088911281612	13060.014818275673	7.52895138237382
814000	7419.474310133125	89.31471276	75.28124259167376	0.47838603310182926	0.4028529999999999	28.268533987414298	7.196890080829132	13363.186323558095	7.467625163946098
814000	7421.029829396161	90.43395296290001	71.44499094302011	0.47838603310182925	0.4028529999999999	29.25032323768177	7.198398934514277	13560.609852821095	7.468415398842105
814000	7385.941640677512	90.43395296290001	73.56702797766043	0.2575925443080063	0.299708	29.00122369056124	7.1643633914571865	12789.54035890715	7.448650394408519
814000	6428.512428409325	101.7691471	72.90196629638466	0.27772939390492524	0.1948119999999999	16.074327167110777	6.235657055557046	11958.020464560197	6.96028477799469
798400	7518.681766308529	91.1479848152	68.98989926837066	0.574963965338226	0.5143	29.88427697336831	7.293121313319274	13718.98922441287	7.512422085941585
938700	7963.702671857763	82.44275794	49.89869636050303	0.1803689230260005	0.4797969999999999	32.63041918154673	7.72479159170203	13136.043828279407	7.803414378979755
798400	6231.713712043367	103.73656742700001	87.25673096879888	0.3997922163457213	0.425917	14.142662253212343	6.044762300682066	12149.507192520612	6.856954651740371
798400	6103.676993502123	103.73656742700001	98.24438574520657	0.47838603310182926	0.4028529999999999	12.67028804531646	5.92056668369706	12281.574492570566	6.791475750531561
790600	7102.270177635072	85.0669684	72.20635355923287	0.42454172149099006	0.2343	18.42659606190946	6.889202072306021	13083.119858286167	7.118625704040901
814000	7131.179963234406	89.53856729	91.13859536392057	0.574963965338226	0.253468	27.2128536785709	6.917244564337374	13649.109233424293	7.318356886113749
793000	7094.117074068196	90.84789126	93.21660856779766	0.574963965338226	0.253468	26.87775240666651	6.881293561846151	13584.824570335028	7.289064157508586
793000	6187.085986662721	104.077792796	90.79784518258212	0.38607283793206215	0.171925	13.90755929459132	6.001473407062839	12071.124009172572	6.8267470918198749
814000	7574.203124636158	89.34759758	66.21543220526546	0.47838603310182926	0.4028529999999999	28.466724974807526	7.346977030897073	13518.761270198213	7.546230496289929
793000	6338.920288293012	104.077792796	78.0687761608088	0.24526622292113626	0.370757	14.002415874907152	6.148752679644222	11767.227907722041	6.907614548069498
798400	7483.150571138128	90.3115468	70.91824916428399	0.42584866741702754	0.239128	29.630624058234986	7.258656054003985	13239.736565538426	7.489197289335647
814000	6161.19080541663	102.786838571	94.98932396938162	0.47838603310182926	0.1058	14.770826529168941	5.976355081254131	12352.385209194008	6.822806296310704
938700	7727.528610125705	82.03803686	61.09902573998821	0.47838603310182926	0.4028529999999999	31.910278325425022	7.495702751821934	13775.703058779616	7.681986403853212
814000	7581.019907448329	89.34759758	65.85568820358885	0.47838603310182926	0.4028529999999999	30.357663185765556	7.353589310224879	13524.440200444571	7.549693558294167
793000	6120.708119418286	104.077792796	97.95139743791309	0.47838603310182926	0.1058	14.5300020544292254	5.937086875835737	12289.481956916166	6.79177624251888
798400	7355.776898519812	91.2143121212	78.58918688264168	0.47838603310182926	0.1058	28.726920992125795	7.135103591564218	13316.213732961996	7.421981862709329
798400	6082.395744348525	102.7094727	100.99281833664263	0.47838603310182926	0.253468	14.359499758369312	5.89992387201807	12269.851477255204	6.77785546661569
814000	7599.486106479601	89.28182793	65.1350846956099	0.47838603310182926	0.253468	29.491639917198967	7.371501523285214	13480.762311587257	7.556265773005173
798400	7556.021844457669	90.24552952	66.9545495332923	0.47838603310182926	0.5143	30.151573183234433	7.32934118912394	13539.090964819172	7.531391592442913
798400	7420.843885050925	91.214662268	73.98595056644436	0.3871871134654693	0.3349719999999999	29.1516086062734	7.198218568499398	13057.819142647759	7.459346463998958
798400	7033.041913047236	94.51976442	77.52309662781309	0.47838603310182926	0.253468	17.922037073299556	6.822050655655819	13040.474344487113	7.260802733238009
793000	7437.163188297906	90.65781301	73.31860562604966	0.47838603310182926	0.337125	27.468254095368323	7.21404829264897	13371.890816897585	7.464911501668361

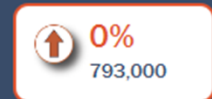


# CROWDSOURCING INFORMATION

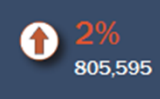
### Acres Developed

Most new growth in Greater Philadelphia has occurred in the region's core cities of Philadelphia, Trenton, Camden, and Chester. Infill and redevelopment in these places has helped the region's central cities remain economic and population centers with balanced transportation systems.

Your Scenario:



Average User Scenario:



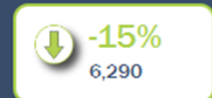
Compare to Today:

790,600

### Vehicle Miles Driven

Vehicle miles traveled (VMT) have decreased in your scenario, helping to reduce congestion, improve road safety, and lower greenhouse gas emissions and the cost of transportation. Reducing VMT means the region will be less energy dependent, and may be more economically competitive than other more spread out regions.

Your Scenario:



Average User Scenario:



Compare to Today:

7,370

### Biking & Walking Trips

Biking and walking have become easier because most new development has occurred in areas where walking is pleasant, and homes, stores, restaurants, schools, parks, and jobs are located in close proximity to one another. Incorporating more physical activity into our transportation system will also improve health.

Your Scenario:



Average User Scenario:



Compare to Today:

85

### Transit Trips

The annual number of transit trips has increased because new development in established areas has made transit a viable alternative to driving for many people.

Your scenario's transit first policies have helped to speed up transit service, helping to attract more riders.

Your Scenario:



Average User Scenario:



Compare to Today:

58



## RESOURCES

- Bootstrap: <http://twitter.github.com/bootstrap/>
- Knockout: <http://knockoutjs.com/>
- Google Analytics: <http://www.google.com/analytics/>
- DVRPC: <http://www.dvrpc.org/>
- Choices & Voices: <http://www.dvrpc.org/ChoicesAndVoices/>