



National Railway Network (NRWN)

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201109

Ottawa



Ressources naturelles
Canada

Natural Resources
Canada

Canada 

Brief History

- Data Model : Work initiated in Spring 2009
 - Conceptual model
 - Data dictionary
 - Data Specifications
- Data source investigation
 - Transport Canada;
 - Economic Analysis Directorate
 - Rail Safety Directorate
 - Provincial Data:
 - British Columbia, Ontario, New Brunswick, Nova Scotia and Manitoba data were used as test cases



Brief History

- Data Model Objective:
 - Pan-Canadian coverage of the cargo, passenger and tourist rail networks
 - Coverage of the local (municipal) transit rail network systems



Partners

- Federal:
 - Transport Canada;
 - Economic Analysis Directorate (rails – linear)
 - Rail Safety Directorate (crossings – points)
 - NRCan
 - Mapping Information Branch, Centre for Topographic Information (geospatial data integrators)
- Provincial:
 - British Columbia, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick and Nova Scotia

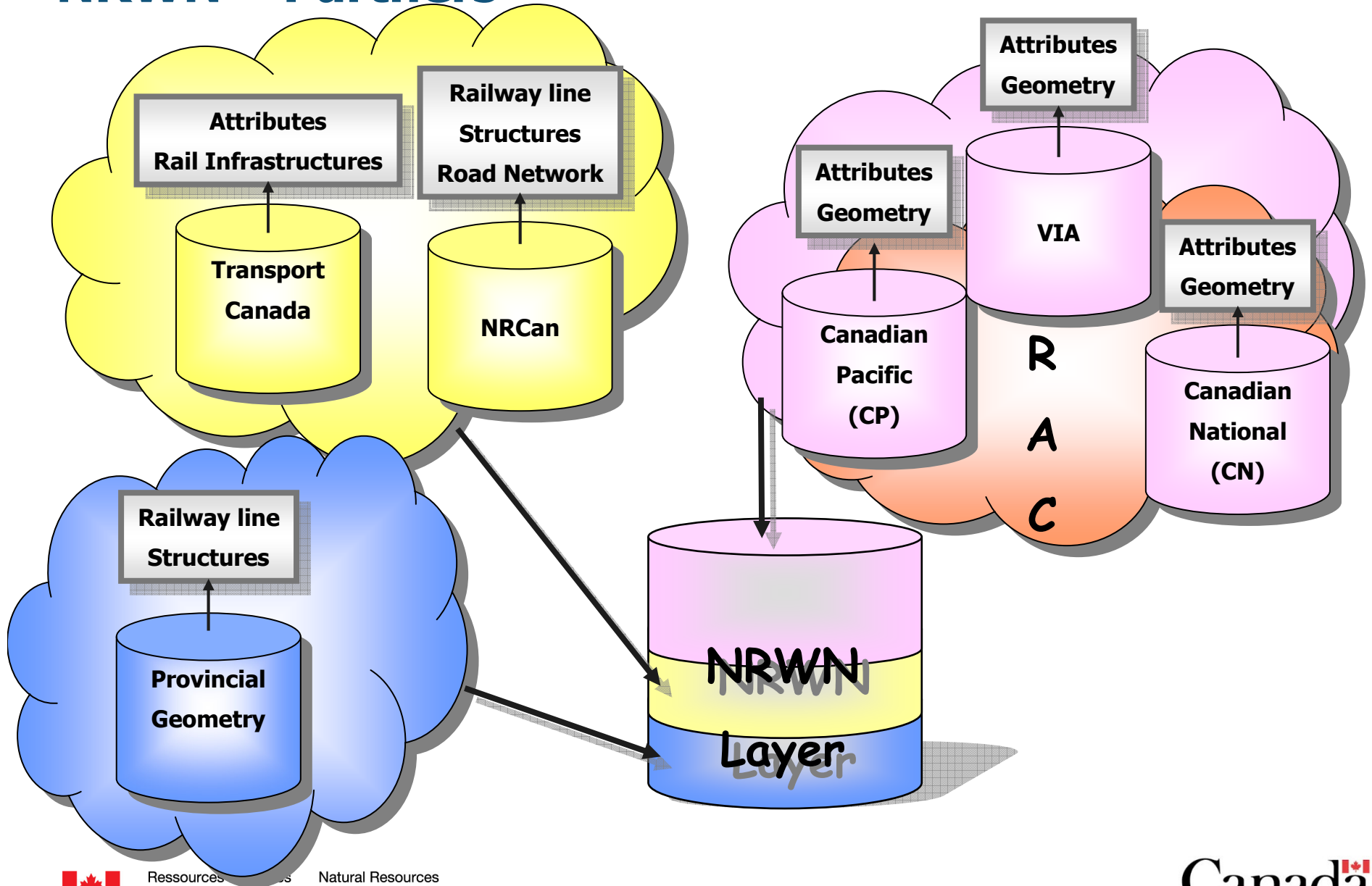


Partners

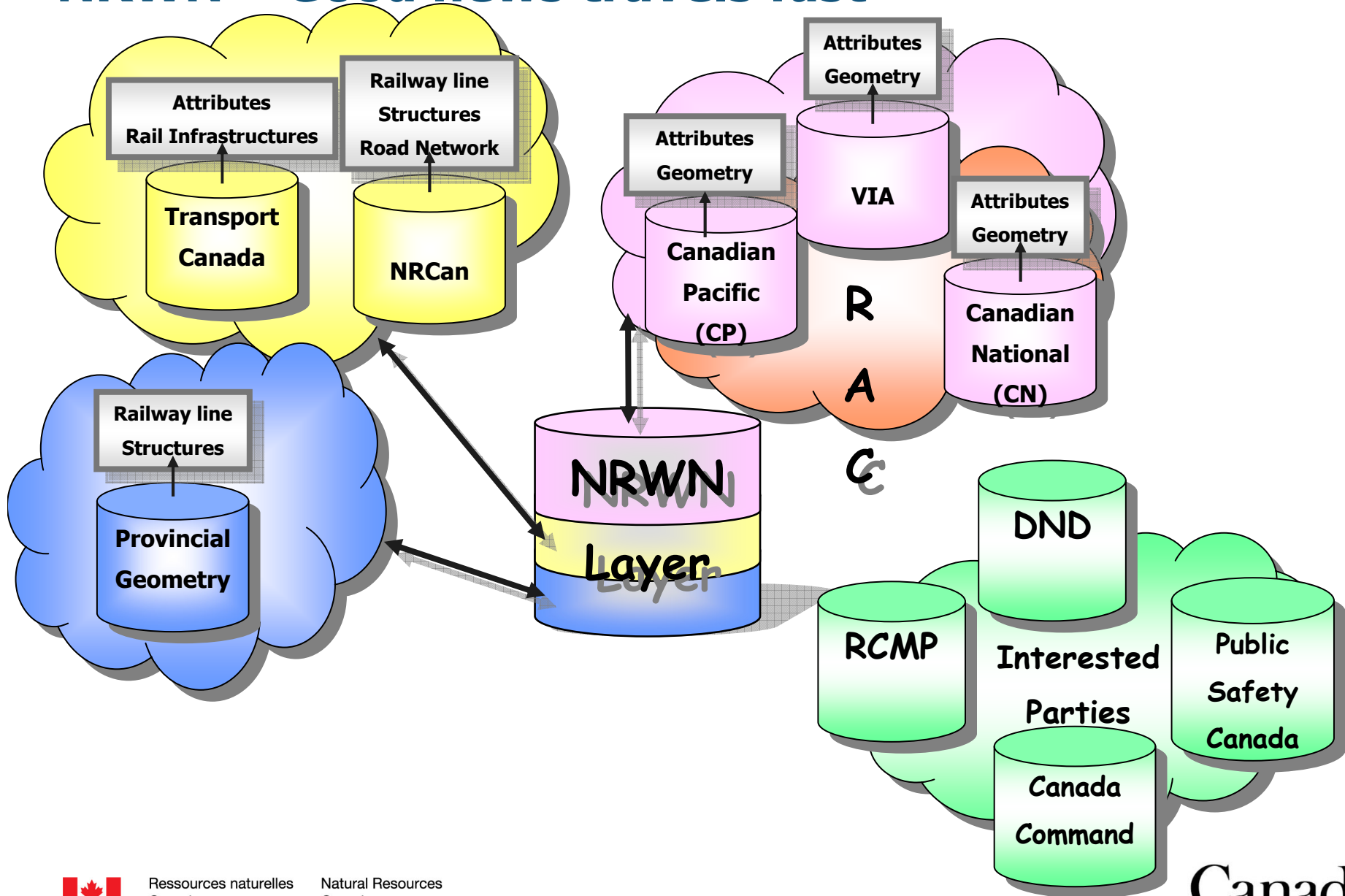
- Private:
 - Railway Association of Canada (RAC)
 - VIA Rail Canada (VIA)
 - Canadian National (CN)
- Interested parties:
 - Department of National Defence (DND)
 - Royal Canadian Mounted Police (RCMP)
 - Public Safety Canada (PS)
 - Canada Command (CC/DND)
 - ...



NRWN – Partners



NRWN – Good news travels fast



Questions

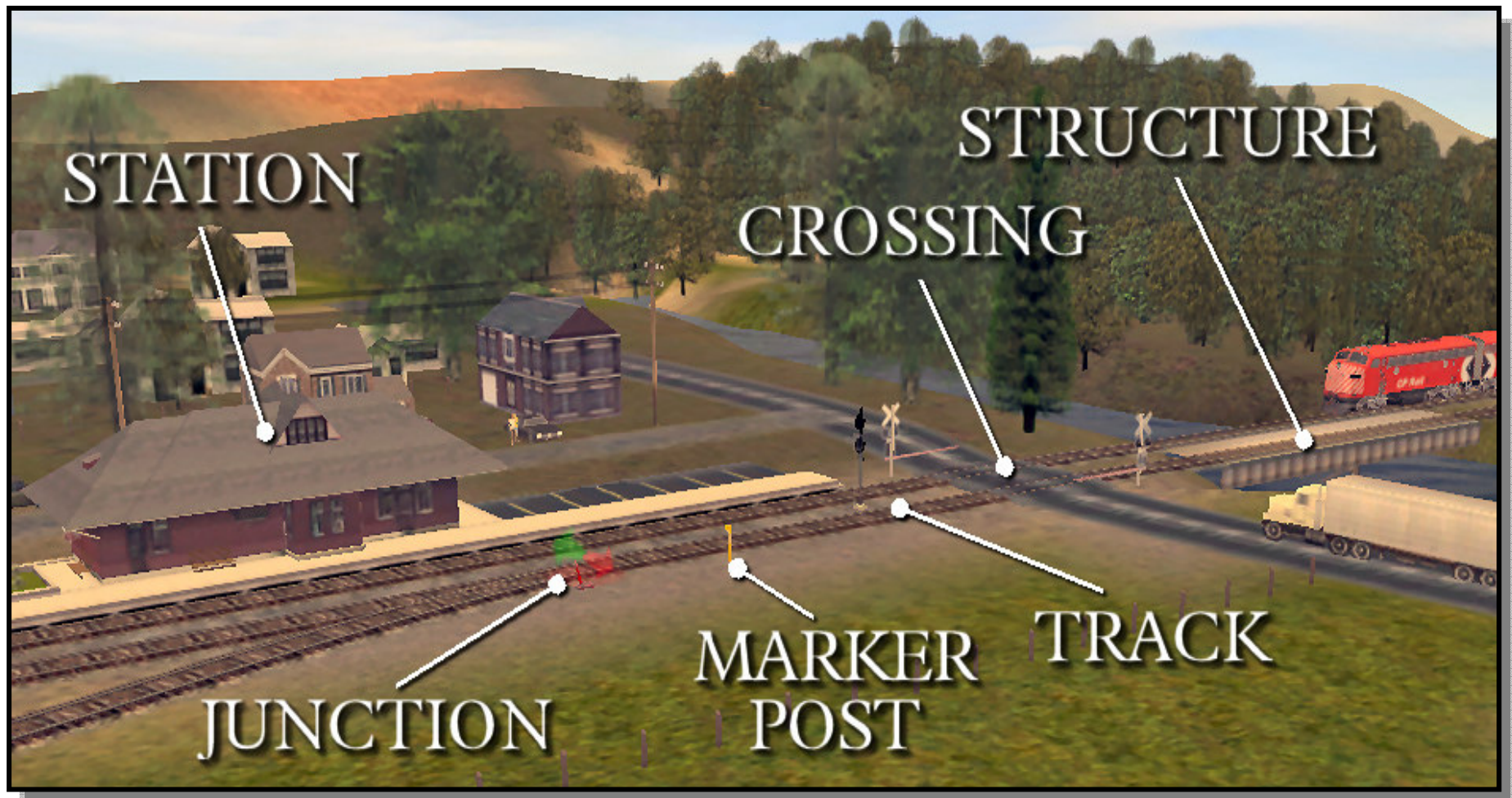


NRWN data features

- Track
- Crossing
- Station
- Structure
- Marker Post
- Junction



NRWN Data



Graphic – J. Gratton created in Trainz Simulator 2006



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Track

- **Definition:**
 - **In the real world, a Track provides a guide for the movement of trains and other equipment. In general, one linear feature represents the two rails of a Track. A Track is bounded by two Junction points and is segmented at each change in attributes along its course.**
- **Attributes:**
 - **Transport Type:** train, monorail, subway, tramway, suspended
 - **Gauge:** Standard, narrow, other
 - **Classification:** main, siding, spur, yard, crossover, wye, connecting, ferry route
 - **Electrification:** yes, no
 - **Use Type:** freight, passenger, tourist, freight and passenger, freight and tourist



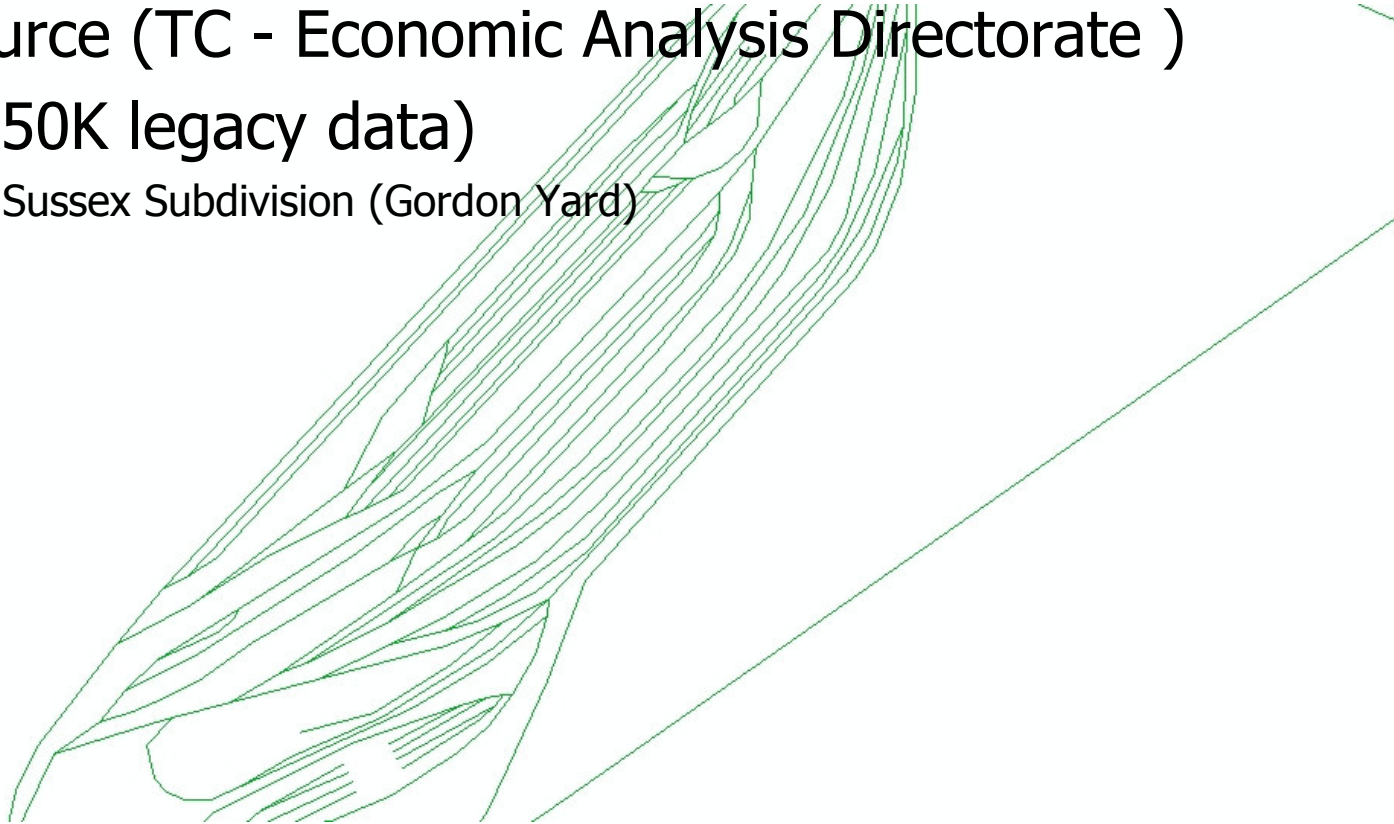
Track

- Data Sources
 - Natural Resources Canada
 - legacy topographic data (linear geometry)
 - Transport Canada ; Economic Analysis Directorate
 - rails (linear geometry and attributes)
 - Provincial data
 - rails geometry (linear geometry)



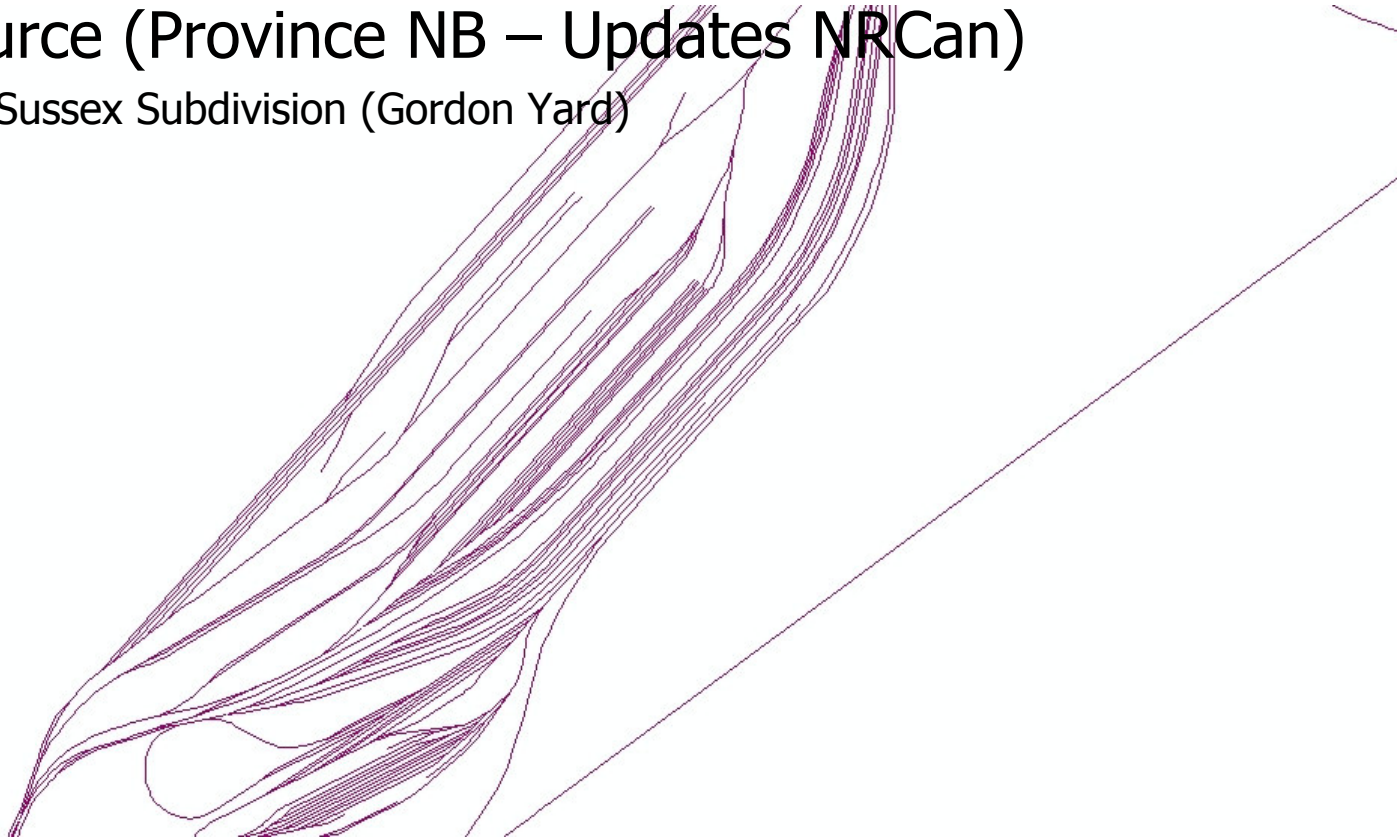
Track : Integration of data and attributes

- Data (Before)
- Source (TC - Economic Analysis Directorate)
- (1:50K legacy data)
 - Sussex Subdivision (Gordon Yard)



Track : Integration of data and attributes

- Data (NRWN)
- Source (Province NB – Updates NRCan)
 - Sussex Subdivision (Gordon Yard)



Track Attributes (Before) source: Transport Canada - Economic Analysis Directorate

▪ FID	494
▪ Shape	Polyline
▪ ID	63732
▪ LENGTH	1.16
▪ DIR	0
▪ RAILWAY	CN
▪ RAILWAY_NA	Canadian National
▪ SUBDIVISIO	Springhill
▪ PROVINCE	NB
▪ START_MILE	0
▪ END_MILE	0
▪ NAME	
▪ TRACK_TYPE	Spur
▪ HEADBLOCK	
▪ STATUS	A
▪ SCALE	Manual
▪ COMMENT	Manually digitized
▪ PASSRAIL	VIA
▪ PASSRAIL	0
▪ LINK_TYPE	2
▪ TRANSFER_P	250
▪ TIME_PENAL	291.19
▪ INACTIVE_T	291.19

Track 1

▪ FID	431
▪ Shape	Polyline
▪ ID	820
▪ LENGTH	6.55
▪ DIR	0
▪ RAILWAY	CN
▪ RAILWAY_NA	Canadian National
▪ SUBDIVISIO	Springhill
▪ PROVINCE	NB
▪ START_MILE	0
▪ END_MILE	136.7
▪ NAME	
▪ TRACK_TYPE	Main Single
▪ HEADBLOCK	
▪ STATUS	A
▪ SCALE	1:50
▪ COMMENT	
▪ PASSRAIL	VIA
▪ PASSRAIL	1
▪ LINK_TYPE	2
▪ TRANSFER_P	250
▪ TIME_PENAL	1636.42
▪ INACTIVE_T	1636.42

Track 2



Track: Attributes (Before)

FID	494
Shape	Polyline
ID	63732
LENGTH	1.16
DIR	0
RAILWAY	CN
RAILWAY_NA	Canadian National
SUBDIVISIO	Springhill
PROVINCE	NB
START_MILE	0
END_MILE	0
NAME	
TRACK_TYPE	Spur
HEADBLOCK	
STATUS	A
SCALE	Manual
COMMENT	Manually digitized
PASSRAIL	VIA
PASSRAIL	0
LINK_TYPE	2
TRANSFER_P	250
TIME_PENAL	291.19
INACTIVE_T	291.19

Attributes

Geometry and **attributes** from Transport Canada

Attributes

Attributes from Transport Canada merged with Provincial geometry



Track: Attributes (NRWN)

▪ NID	e4e7efc3d0f54b6b81bfbff066b12ab99f0b2679a275461a93a3a02fa4db17e8
▪ trackSegmentID	
▪ trackName	Vic Indust. Spur A
▪ trackClassification	Spur
▪ trackOperator	Canadian National
▪ trackUser1	None
▪ trackUser2	None
▪ trackUser3	None
▪ trackUser4	None
▪ type	Train
▪ use	Freight
▪ gauge	Standard
▪ numberOfTracks	1
▪ electrification	False
▪ status	Operational
▪ designSpeedFreight	Unkown
▪ designSpeedPassenger	Unkown
▪ unitOfSpeed	Mile
▪ sourceID	None
▪ subdivision1NID	53664e5b24034b84950fa5a87737c8dd
▪ subdivision1Name	Springhill
▪ subdivision1Start	0
▪ subdivision1End	138.4
▪ subdiv1UnitOfDistance	Mile
▪ subdivision2NID	None
▪ subdivision2Name	None
▪ subdivision2Start	Unknown
▪ subdivision2End	Unknown
▪ subdiv2UnitOfDistance	Mile
▪ operatorStart	None
▪ operatorEnd	None
▪ datasetName	New Brunswick
▪ standardsVersion	1.0
▪ securityClass	Unclassified
▪ geoCreationDate	201109
▪ geoRevisionDate	
▪ geoAcquisitionTechnique	Vector Data
▪ geoPlanimetricAccuracy	10
▪ geoProvider	Provincial Territorial
▪ attCreationDate	201010
▪ attRevisionDate	
▪ attAcquisitionTechnique	Vector Data
▪ attProvider	Federal

▪ NID	d6ad5f0c1f8a47f4a6288e4da04b7435de845c55b62c4619a6b3798a30446a56
▪ trackSegmentID	
▪ trackName	
▪ trackClassification	Main
▪ trackOperator	Canadian National
▪ trackUser1	VIA
▪ trackUser2	None
▪ trackUser3	None
▪ trackUser4	None
▪ type	Train
▪ use	Freight And Passenger
▪ gauge	Standard
▪ numberOfTracks	1
▪ electrification	False
▪ status	Operational
▪ designSpeedFreight	Unkown
▪ designSpeedPassenger	Unkown
▪ unitOfSpeed	Mile
▪ sourceID	None
▪ subdivision1NID	53664e5b24034b84950fa5a87737c8dd
▪ subdivision1Name	Springhill
▪ subdivision1Start	0
▪ subdivision1End	138.4
▪ subdiv1UnitOfDistance	Mile
▪ subdivision2NID	None
▪ subdivision2Name	None
▪ subdivision2Start	Unknown
▪ subdivision2End	Unknown
▪ subdiv2UnitOfDistance	Mile
▪ operatorStart	None
▪ operatorEnd	None
▪ datasetName	New Brunswick
▪ standardsVersion	1.0
▪ securityClass	Unclassified
▪ geoCreationDate	201109
▪ geoRevisionDate	
▪ geoAcquisitionTechnique	Vector Data
▪ geoPlanimetricAccuracy	10
▪ geoProvider	Provincial Territorial
▪ attCreationDate	201010
▪ attRevisionDate	
▪ attAcquisitionTechnique	Vector Data
▪ attProvider	Federal



Questions



Crossing

- **Definition:**
 - **Location along the rail network where a Track crosses another network. It identifies the location and type of crossing that traverses either on, above or below a Track element. A Crossing includes any Structure supporting or protecting that part of the Track or facilitating the crossing. Crossings are often equipped with public warning signs and audio/visual signalling safeguards to control and protect vehicular and pedestrian traffic.**
- **Attributes:**
 - **Crossing Level:** at grade, over, under, combination
 - **Crossing type:** trail, hydrographic, road, track, pipeline, transmission line
 - **Warning Type:** FLB, FLBG, STOP, SRCS and STOP, none, closed gate, walk don't walk, other



Crossing

- Data Sources
 - Natural Resources Canada
 - National Road Network - NRN (linear geometry)
 - Transport Canada ; Rail Safety Directorate
 - Inventory of Rail Infrastructure System (IRIS) database - crossings (points)
 - Provincial
 - Hydrographic network (linear geometry)
 - Rail data (linear geometry)
 - CN

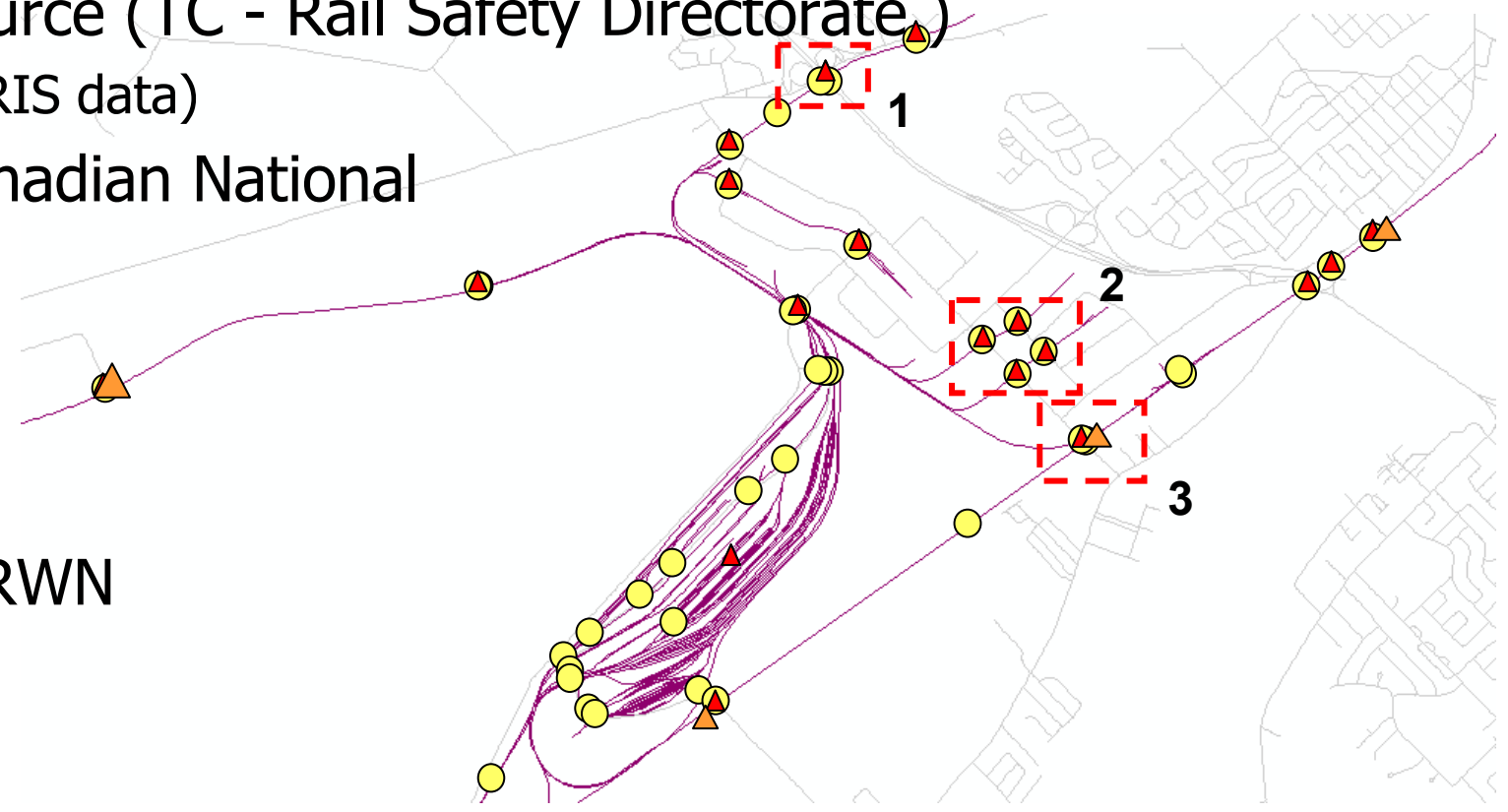


Crossing: Integration of data and attributes

▲ Source (TC - Rail Safety Directorate)
(IRIS data)

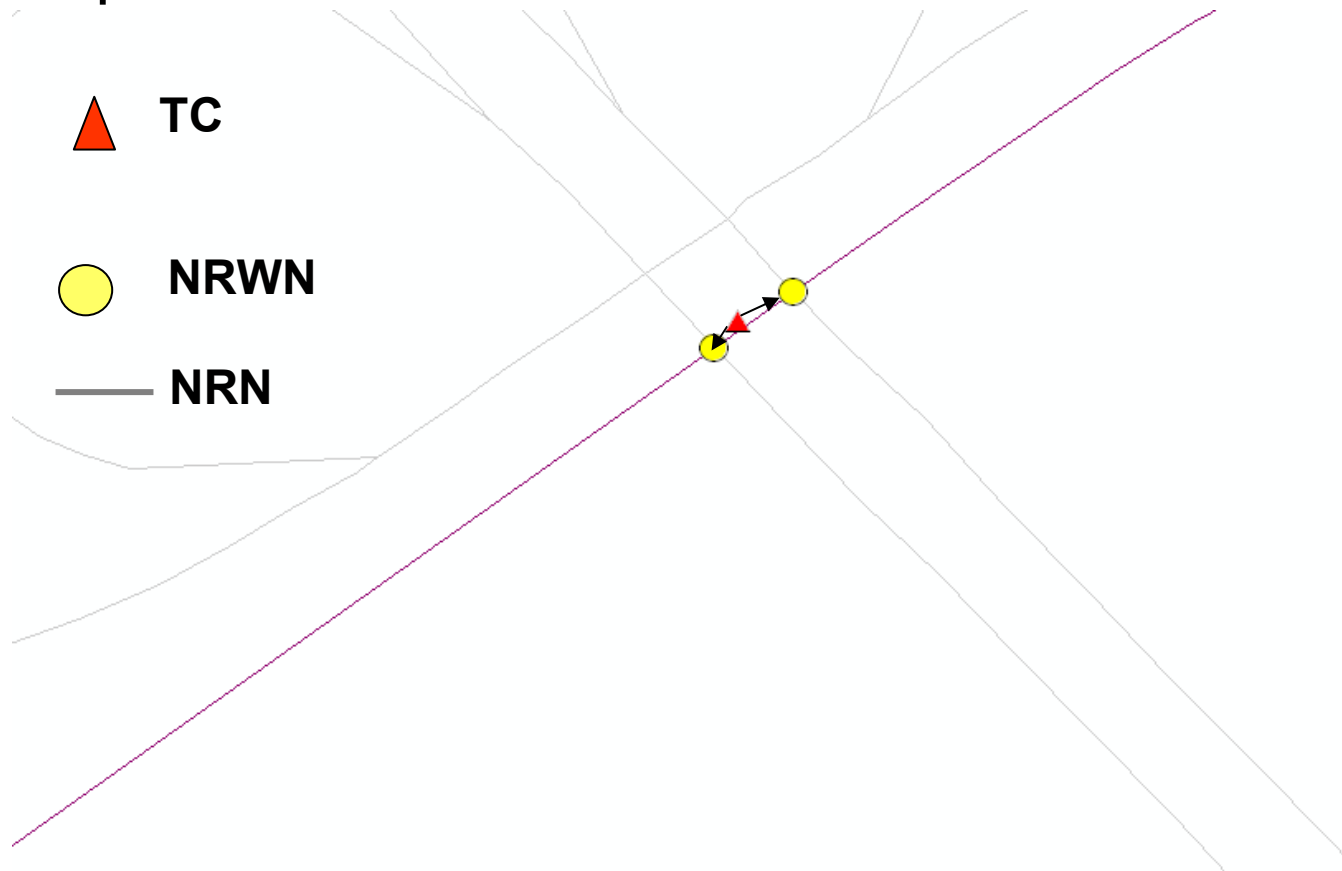
▲ Canadian National

● NRWN



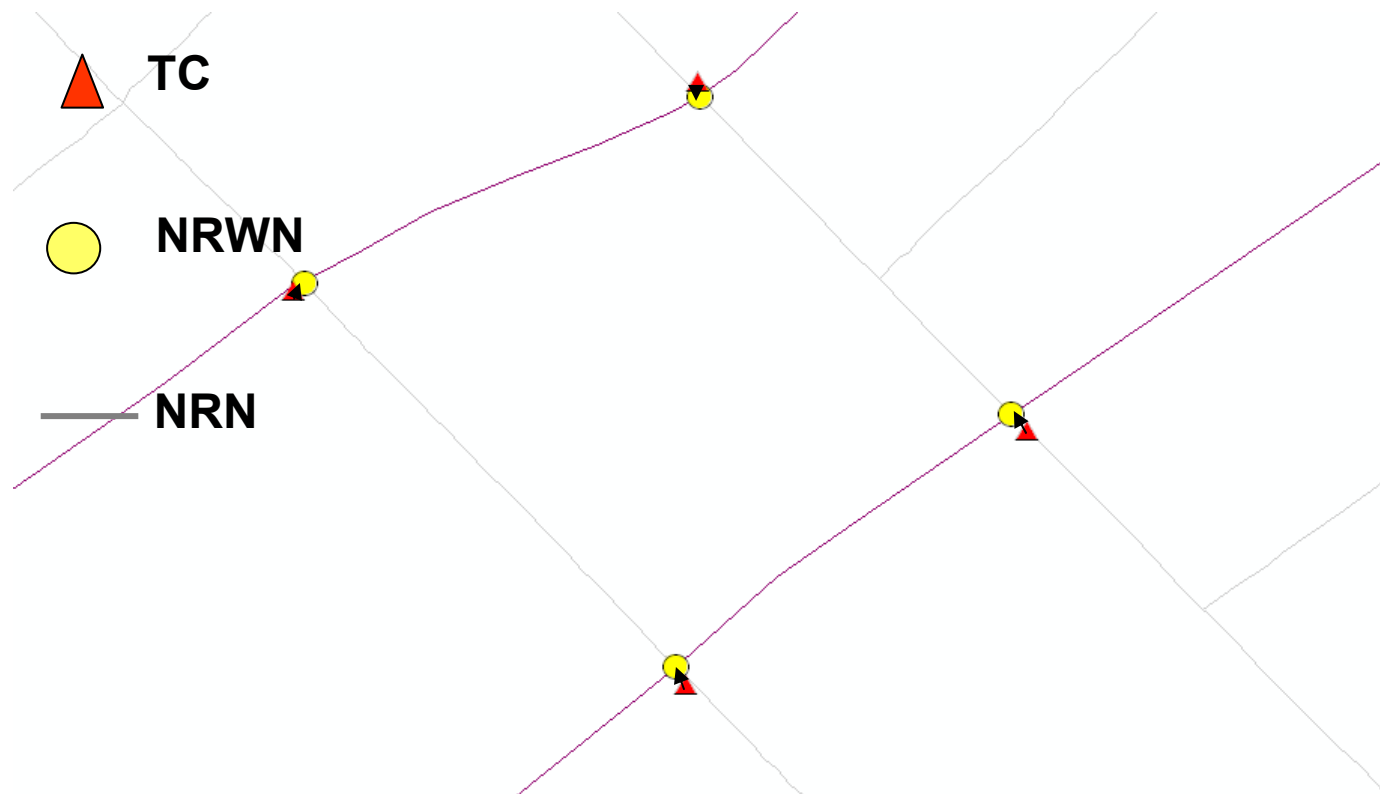
Crossing: Integration of data and attributes

- (1) Duplicated



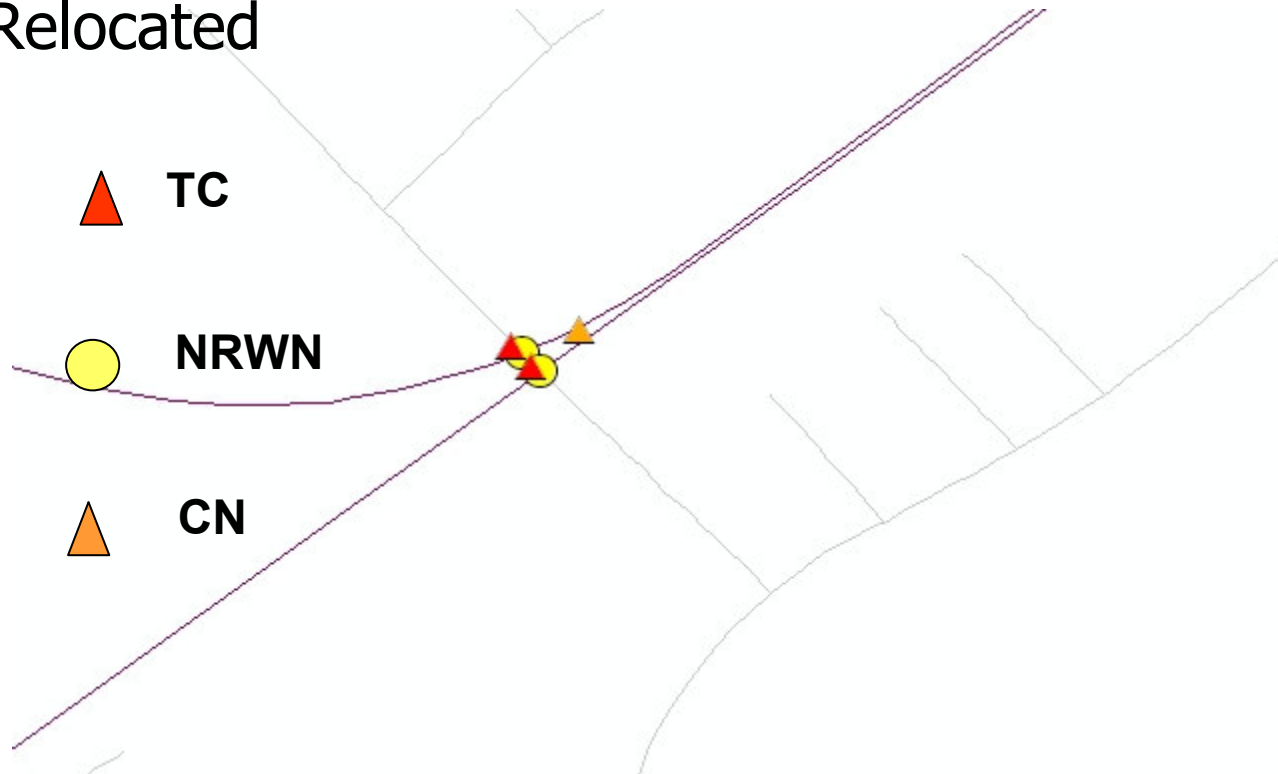
Crossing: Integration of data and attributes

- (2) Relocated



Crossing: Integration of data and attributes

- (3) Relocated



Crossing: Attributes (Before), source Transport Canada

FID	9096
Shape	Point
LATITUDE	46.0941
LONGITUDE	-64.8376
TC_CROSSING	34264
RWY	CN
ACCESS	PUBLIC
PROTECTION	GS-SUBWAY
LOCATION	WHEELER BLVD.
LOC_TYPE	Xing
MILE	0.88
MAIN	128.9
SUB	SPRINGHILL
LEVEL01	0.88
SPUR_01	FRANKLIN
LEVEL02	0
SPUR_02	
LEVEL03	0
SPUR_03	
LEVEL04	0
SPUR_04	
LEVEL_05	0
SPUR_05	

FID	9091
Shape	Point
LATITUDE	46.0769
LONGITUDE	-64.8326
TC_CROSSING	6803
RWY	CN
ACCESS	PUBLIC
PROTECTION	SRCS
LOCATION	LOFTUS ST.
LOC_TYPE	Xing
MILE	0.66
MAIN	128.17
SUB	SPRINGHILL
LEVEL01	0.66
SPUR_01	MONCTON IND LEAD 1
LEVEL02	0
SPUR_02	
LEVEL03	0
SPUR_03	
LEVEL04	0
SPUR_04	
LEVEL_05	0
SPUR_05	



Crossing: Attributes (Before), source Canadian National (CN)

▪ FID	2809
▪ Shape	Point
▪ SUB_NO	146
▪ TRACK_ID	01
▪ TRACK_NAME	SUSSEX S/D
▪ MILEAGE	1.9
▪ PROVINCE	NB
▪ CROSSING_T	Public
▪ HIGHWAY_NU	
▪ HIGHWAY_NA	YMCA HUMP YARD
▪ TC_DOT_NO	42760
▪ POSITION	At Grade
▪ TRAFFIC_CO	Flashing Lights
▪ METHOD	CTC
▪ CANTILIVER	
▪ SURFACE_TY	Asphalt
▪ LAT	46.068595
▪ LON	-64.865493
▪ DQI	8



Crossing: Attributes (Before), source IRIS

Geometry and
attributes from
 Transport Canada
 IRIS

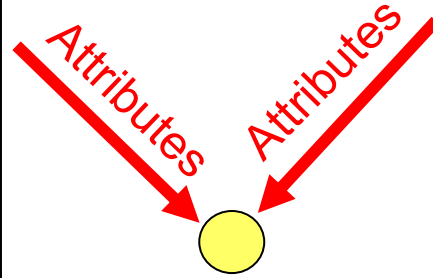


FID	9096
Shape	Point
LATITUDE	46.0941
LONGITUDE	-64.8376
TC_CROSSING	34264
RWY	CN
ACCESS	PUBLIC
PROTECTION	GS-SUBWAY
LOCATION	WHEELER BLVD.
LOC_TYPE	Xing
MILE	0.88
MAIN	128.9
SUB	SPRINGHILL
LEVEL01	0.88
SPUR_01	FRANKLIN
LEVEL02	0
SPUR_02	
LEVEL03	0
SPUR_03	
LEVEL04	0
SPUR_04	
LEVEL_05	0
SPUR_05	

Geometry and
attributes from CN



FID	2809
Shape	Point
SUB_NO	146
TRACK_ID	01
TRACK_NAME	SUSSEX S/D
MILEAGE	1.9
PROVINCE	NB
CROSSING_T	Public
HIGHWAY_NU	
HIGHWAY_NA	YMCA HUMP YARD
TC_DOT_NO	42760
POSITION	At Grade
TRAFFIC_CO	Flashing Lights
METHOD	CTC
CANTILIVER	
SURFACE_TY	Asphalt
LAT	46.068595
LON	-64.865493
DQI	8



Attributes from
 IRIS and CN
 merged with best
 track geometry
 and road network
 intersections



Crossing : Attributes (NRWN)

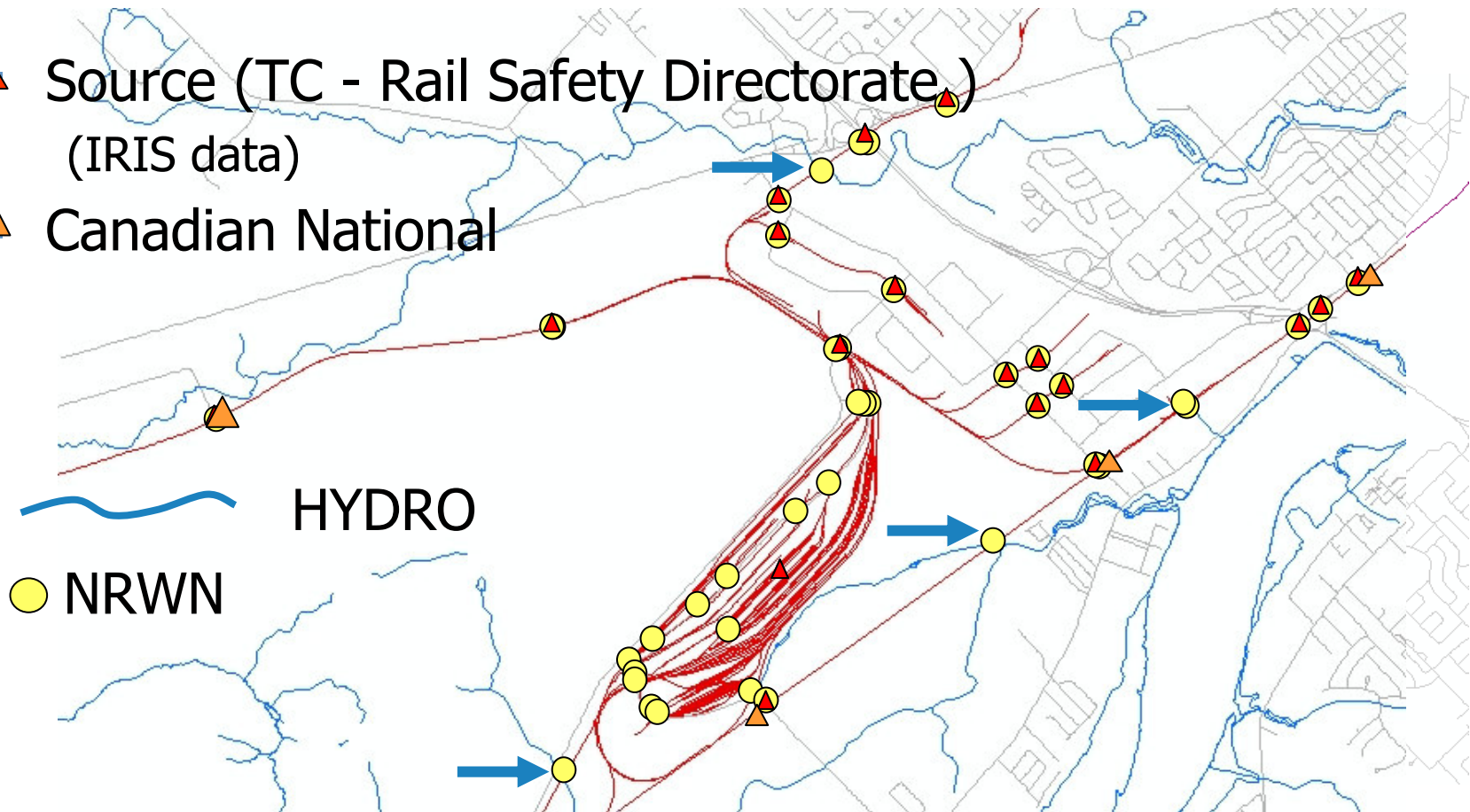
▪ NID	0d594482e127426198cfefbcf464f1be
▪ crossingID	None
▪ levelOfCrossing	At Grade
▪ type	Road
▪ warningSystem	SRCS
▪ functionalRoadClassification	Local Street
▪ crossingTypeName	Loftus Street
▪ routeNumber	None
▪ access	Public
▪ TCID	6803
▪ trackNID	fc0573b478aa4528917e5264a45fe05b
▪ trackName	Moncton Ind Lead 1
▪ trackClassification	Spur
▪ subdivision1NID	53664e5b24034b84950fa5a87737c8dd
▪ subdivision1Name	Springhill
▪ subdivision1Distance	0.66
▪ subdiv1UnitOfDistance	Mile
▪ subdivision2NID	None
▪ subdivision2Name	None
▪ subdivision2Distance	None
▪ subdiv2UnitOfDistance	Mile
▪ datasetName	New Brunswick
▪ standardsVersion	1.0
▪ securityClass	Unclassified
▪ geoCreationDate	201109
▪ geoRevisionDate	
▪ geoAcquisitionTechnique	Vector Data
▪ geoPlanimetricAccuracy	10
▪ geoProvider	Federal
▪ attCreationDate	201010
▪ attRevisionDate	
▪ attAcquisitionTechnique	Vector Data
▪ attProvider	Federal

▪ NID	387769365ba441aba7f12fd75fa3ee15
▪ crossingID	eea20c363add4e42be0b22a44ce65d87
▪ levelOfCrossing	Over
▪ type	Road
▪ warningSystem	None
▪ functionalRoadClassification	Freeway
▪ crossingTypeName	Wheeler Boulevard
▪ routeNumber	15
▪ access	Public
▪ TCID	34264
▪ trackNID	03ab29eed61542ecafa4d39b7a37dbf2
▪ trackName	Franklin
▪ trackClassification	Spur
▪ subdivision1NID	53664e5b24034b84950fa5a87737c8dd
▪ subdivision1Name	Springhill
▪ subdivision1Distance	0.88
▪ subdiv1UnitOfDistance	Mile
▪ subdivision2NID	None
▪ subdivision2Name	None
▪ subdivision2Distance	None
▪ subdiv2UnitOfDistance	Mile
▪ datasetName	New Brunswick
▪ standardsVersion	1.0
▪ securityClass	Unclassified
▪ geoCreationDate	201109
▪ geoRevisionDate	
▪ geoAcquisitionTechnique	Vector Data
▪ geoPlanimetricAccuracy	10
▪ geoProvider	Federal
▪ attCreationDate	201010
▪ attRevisionDate	
▪ attAcquisitionTechnique	Vector Data
▪ attProvider	Federal



Crossing: Integration of hydrography

- ▲ Source (TC - Rail Safety Directorate)
(IRIS data)
- ▲ Canadian National



Crossing: Integration of other data

- Transmission Lines
- Pipelines
- Recreational trails

- These features are modeled in the NRW. However the development of each of these themes need to be implemented and data sources validated after which they can be integrated in the NRW data in the future.



Crossing: Cross reference table NRN-TC-CN

- The Identifiers from the NRN, TC and CN will be cross referenced to one another. The table will contain a list of all the identifiers and the gaps between each source
 - Match between NRN & TC
 - Match between NRN and CN
 - Match between TC and CN

 - No match for NRN
 - No match for CN
 - No match for TC



Questions



Station

- Definition:

Location identified by a Station name sign and designated by that name in a time table (schedule listing the times at which certain events, such as arrivals and departures at a Station, are expected to take place).

- Notes:

- 1) A station or a stop does not necessarily have to be a building.

Ref: FGDC-STD-014.7b-2008

- 2) A Station is associated with up to two separate Track features sharing the same Track Classification and Name for the same or a different Subdivision.



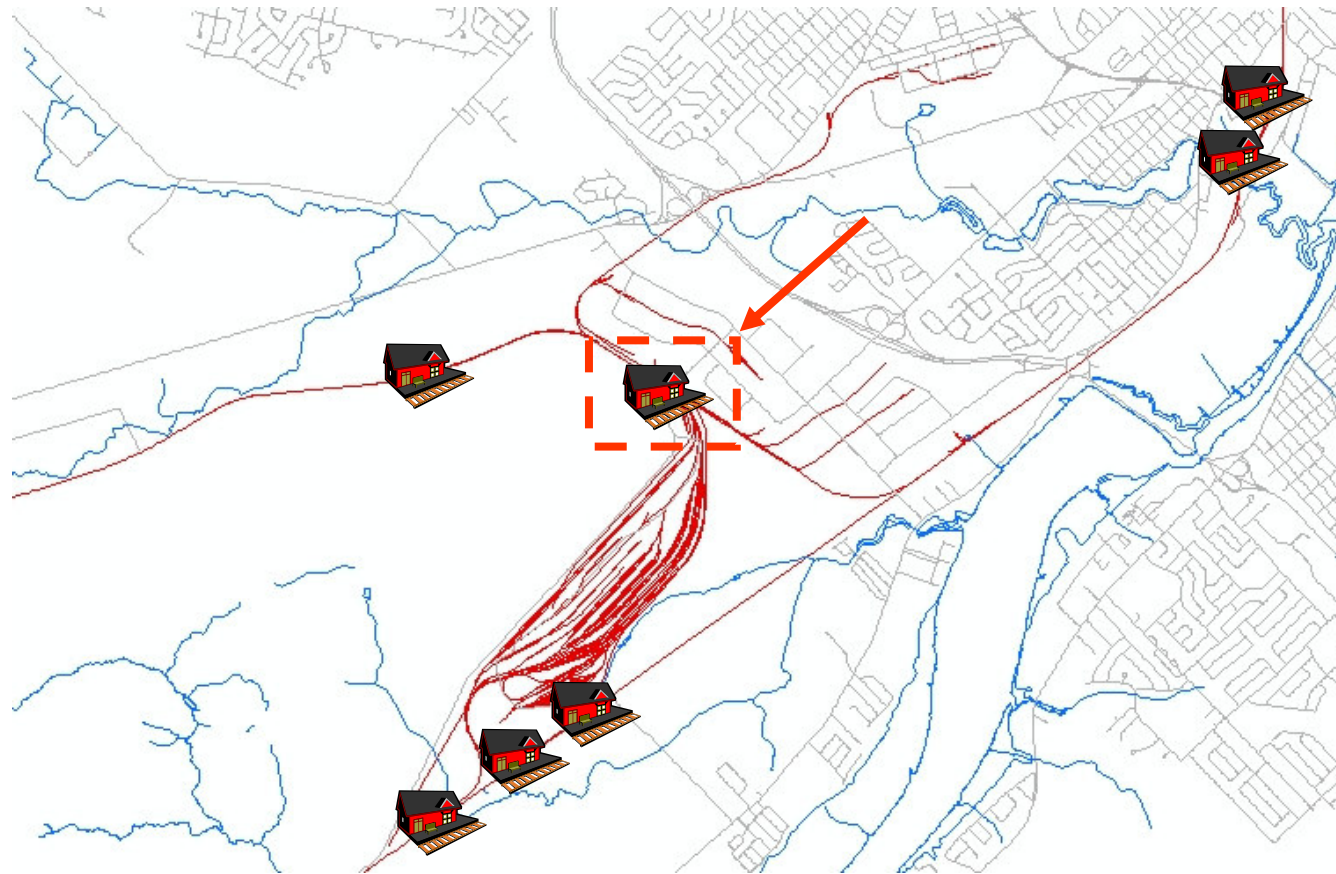
Station

- **Attributes:**
 - **Station Type:** passenger, maintenance, intermodal, other, mixed, freight
 - **Station Users:** user1, user2, user3, user4
 - **Subdivision:** Sub1, Sub2
 - **Station Operator**
 - **Station Name**
 - **Subdivision Mileage**
- **Data Sources**
 - **Natural Resources Canada**
 - National Road Network (point geometry)
 - **CN**
 - Mileage, Subdivision, Name (point geometry)
 - **VIA**
 - Excel file – Tabular - Timetable (Subdivision and mileage)



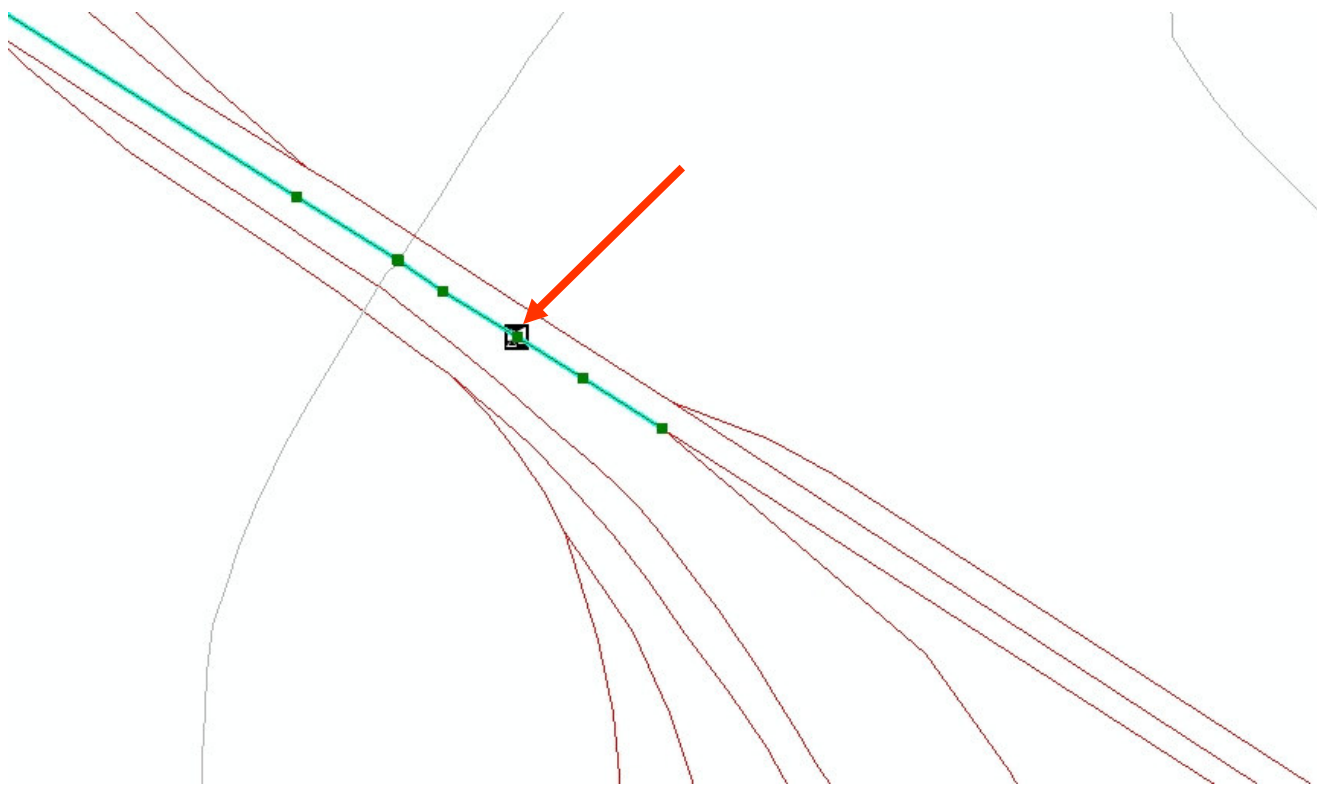
Station

- Integration: Data from CN and VIA



Station

- Integration: Station located on a vertex of the Track. Location based on mileage provided.



Station

- Attributes from VIA:
 - Subdivision distance
 - Station name

- Attributes from CN:
 - Subdivision distance
 - Station name



Station NRWN attributes

CN Station data

VIA Station data

RAC Atlas

NID	e5ee87fb940d4d54bf355f0801c7edea
englishNameStation	Odlum
frenchNameStation	Odlum
stationType	Passenger Station
stationTypeCode	1
stationUser1	VIA
stationUser2	-1
stationUser 3	-1
stationUser4	-1
numberOfPlatforms	-1
trackNID	d6ad5f0c1f8a47f4a6288e4da04b7435
trackName	None
trackClassification	Main
trackClassificationCode	1
subdivision1NID	53664e5b24034b84950fa5a87737c8dd
subdivision1Name	Springhill
subdivision1Distance	129.7
subdiv1UnitOfDistance	Mile
subdiv1UnitOfDistanceCode	1
subdivision2NID	-1
subdivision2Name	-1
subdivision2Distance	-1
subdiv2UnitOfDistance	Mile
subdiv2UnitOfDistanceCode	1
datasetName	New Brunswick
standardsVersion	1.0
securityClassification	Unclassified
securityClassificationCode	2
geometryCreationDate	201109
geometryRevisionDate	None
geometryAcquisitionTechnique	Vector Data
geometryAcquisitionTechniqueCode	6
geometryPlanimetricAccuracy	10
geometryProvider	Federal
geometryProviderCode	2
attributeCreationDate	201010
attributeRevisionDate	
attributeAcquisitionTechnique	Vector Data
attributeAcquisitionTechniqueCode	6
attributeProvider	Federal
attributeProviderCode	2



Questions



Structure (Point and Line)

- Definition:
 - Manmade structure built to support or protect a Track. It may be built at, above, or below grade level.
- Attributes:
 - **Structure type:** bridge, bridge moveable, snow shed, tunnel, culvert, dam
 - **TrackNID, S subdivisionNID, Subdivision distance, Track Name, Track classification**

NID: Unique National Identifier



Structure (Point and Line)

- Data Sources
 - Natural Resources Canada
 - National Road Network (cross reference with Track feature)
 - Hydrographic (cross reference with Track feature)
 - Provincial data
 - Road and hydrographic data (cross reference with Track feature)



Structure (Point and Line)

- Linear Structures —

- Point Structures ▲



Structure (Point and Line)

■ Attributes

■ NID	■ 060f6fdaf7f74825b09dded96bf94181
■ structureID	■ -1
■ englishNameStructure	■ None
■ frenchNameStructure	■ None
■ structureType	■ Bridge
■ structureTypeCode	■ 1
■ trackNID	■ 03ab29eed61542ecafa4d39b7a37dbf2
■ trackName	■ Franklin
■ trackClassification	■ Spur
■ trackClassificationCode	■ 3
■ subdivision1NID	■ 53664e5b24034b84950fa5a87737c8dd
■ subdivision1Name	■ Springhill
■ subdivision1Distance	■ -1
■ subdiv1UnitOfDistance	■ Mile
■ subdiv1UnitOfDistanceCode	■ 1
■ subdivision2NID	■ -1
■ subdivision2Name	■ -1
■ subdivision2Distance	■ -1
■ subdiv2UnitOfDistance	■ Mile
■ subdiv2UnitOfDistanceCode	■ 1
■ datasetName	■ New Brunswick
■ standardsVersion	■ 1.0
■ securityClassification	■ Unclassified
■ securityClassificationCode	■ 2
■ geometryCreationDate	■ 201109
■ geometryRevisionDate	
■ geometryAcquisitionTechnique	■ Vector Data
■ geometryAcquisitionTechniqueCode	■ 6
■ geometryPlanimetricAccuracy	■ Unknown
■ geometryProvider	■ Federal
■ geometryProviderCode	■ 2
■ attributeCreationDate	■ 201010
■ attributeRevisionDate	
■ attributeAcquisitionTechnique	■ Vector Data
■ attributeAcquisitionTechniqueCode	■ 6
■ attributeProvider	■ Federal
■ attributeProviderCode	■ 2



Questions



Marker Post

- Definition:
 - Sign indicating the distance along the network.
- Attributes:
 - TrackName, TrackNID, Subdivision, TrackClassification, Subdivision Distance, Unit of Measure



Marker Post

- Data Sources
 - CN
 - Mileage (point geometry)
 - VIA
 - Excel file – Tabular - Timetable (Subdivision and mileage)



Marker Post

- We are integrating Marker Post in the first release of the NRWN datasets.
- Users are cautioned regarding the use or reliability of their spatial location since we have been informed that the positions are deemed not accurate (+- .5 miles).



NRWN Objectives and Targets

- Data
 - Still require a data license agreement from BC and QC in order to release the data on the Web with the appropriate IP licence.
- Supporting documentation
 - Data Dictionary
 - Data Specifications
 - Change management rules
- Publication
 - Release of some first datasets targeted for spring 2012



Objectives and Targets

- Defining update mechanisms
 - Currently nothing is defined for the NRW
 - Discussions need to be held with the various partners in order to determine the best possible update mechanisms
 - Provincial, Federal and Private sector must be involved in order to succeed
 - Rules and processes must be established in order for everyone to remain synchronized



Questions

