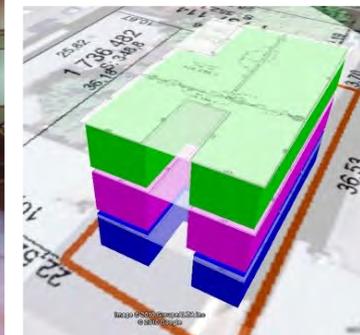
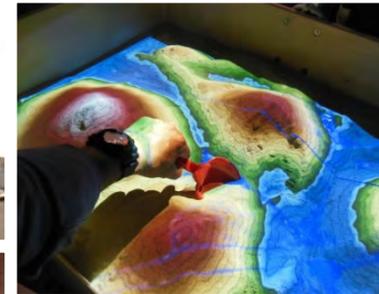
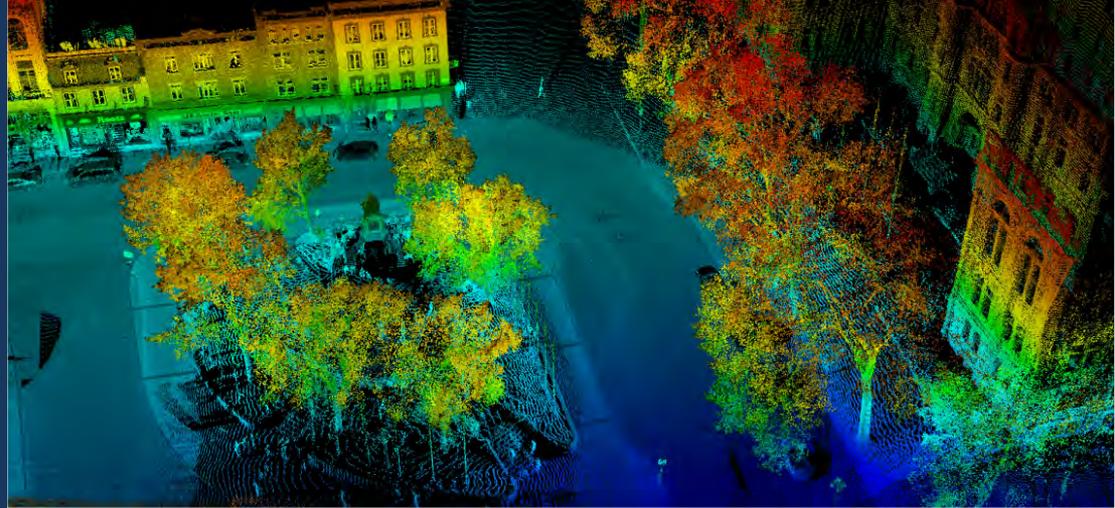




**Le géospatial une
dimension
incontournable pour
la valorisation des
données et la prise de
décision**

**Thierry Badard, CRG
directeur**



**UNIVERSITÉ
LAVAL**

Faculté de foresterie, de géographie
et de géomatique

LE GEOSPATIAL VOUS DITES ?



IMAGE: GETTY - CONTRIBUTOR



VOUS ÊTES PERDUS ...



VOUS ÊTES PERDUS ...

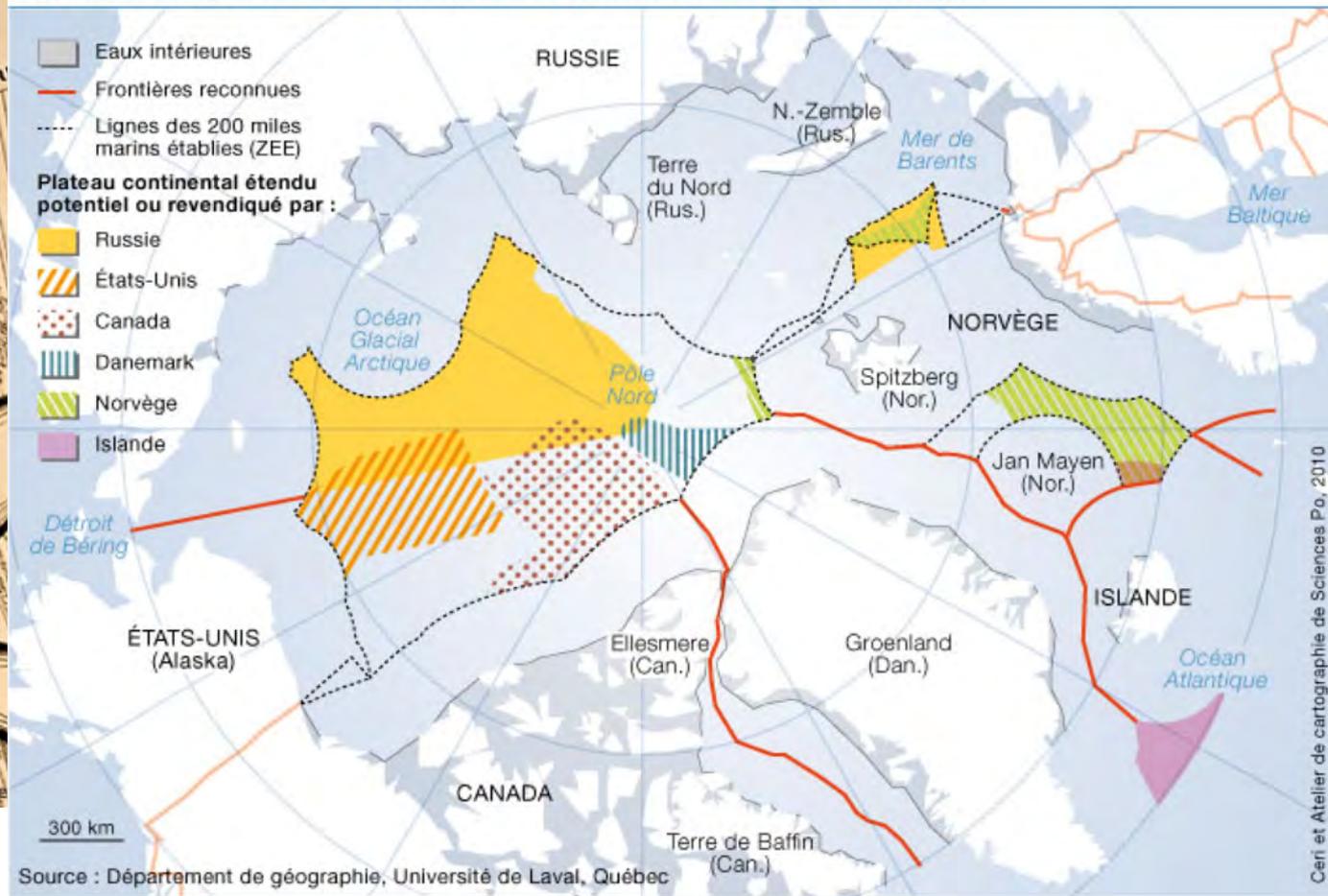


DE LA CARTE AU GEOSPATIAL



DE LA CARTE AU GEOSPATIAL

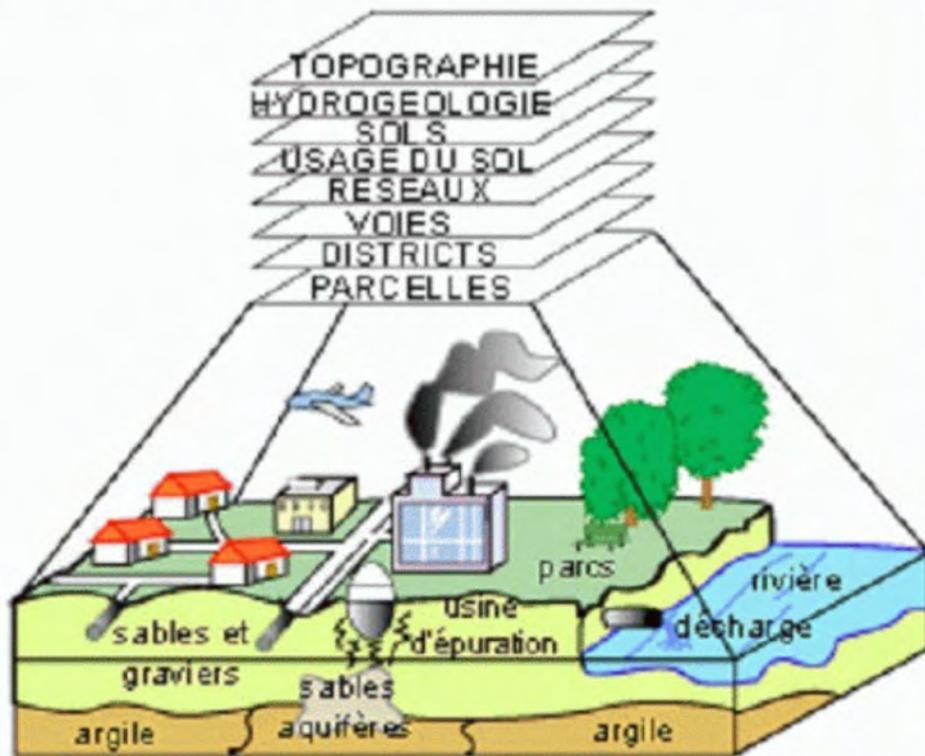
Frontières négociées, revendiquées et potentielles dans l'Arctique



DE LA CARTE AU GEOSPATIAL



des données, reflet de la réalité organisées en système d'information



et des utilisateurs...

Musée de

300 km

CANADA

Terre de Baffin
(Can.)

Source : Département de géographie, Université de Laval, Québec

Ceri et Atelli

DE LA CARTE AU GEOSPATIAL



ateurs...

Ceri et Atelli

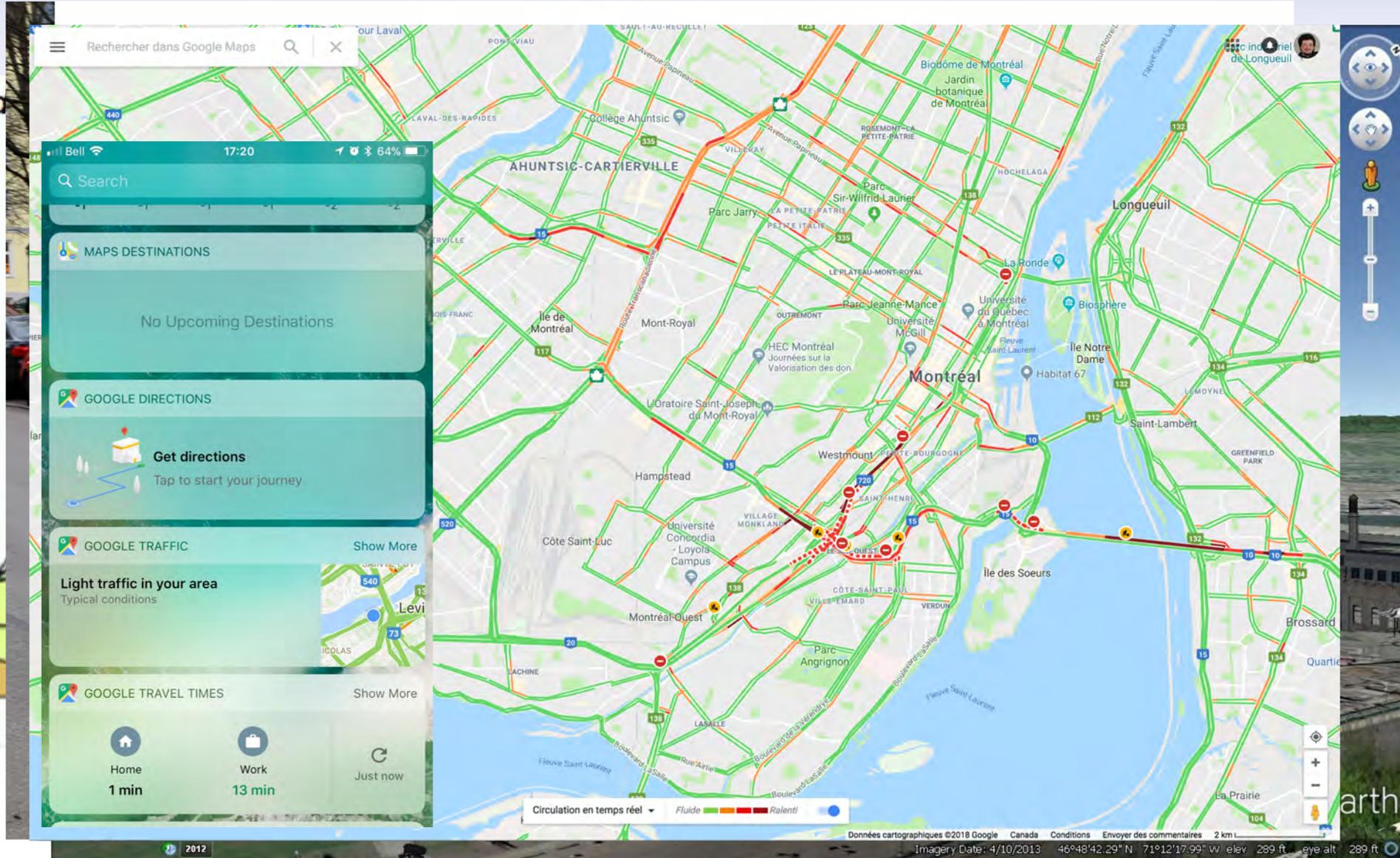
DE LA CARTE AU GEOSPATIAL



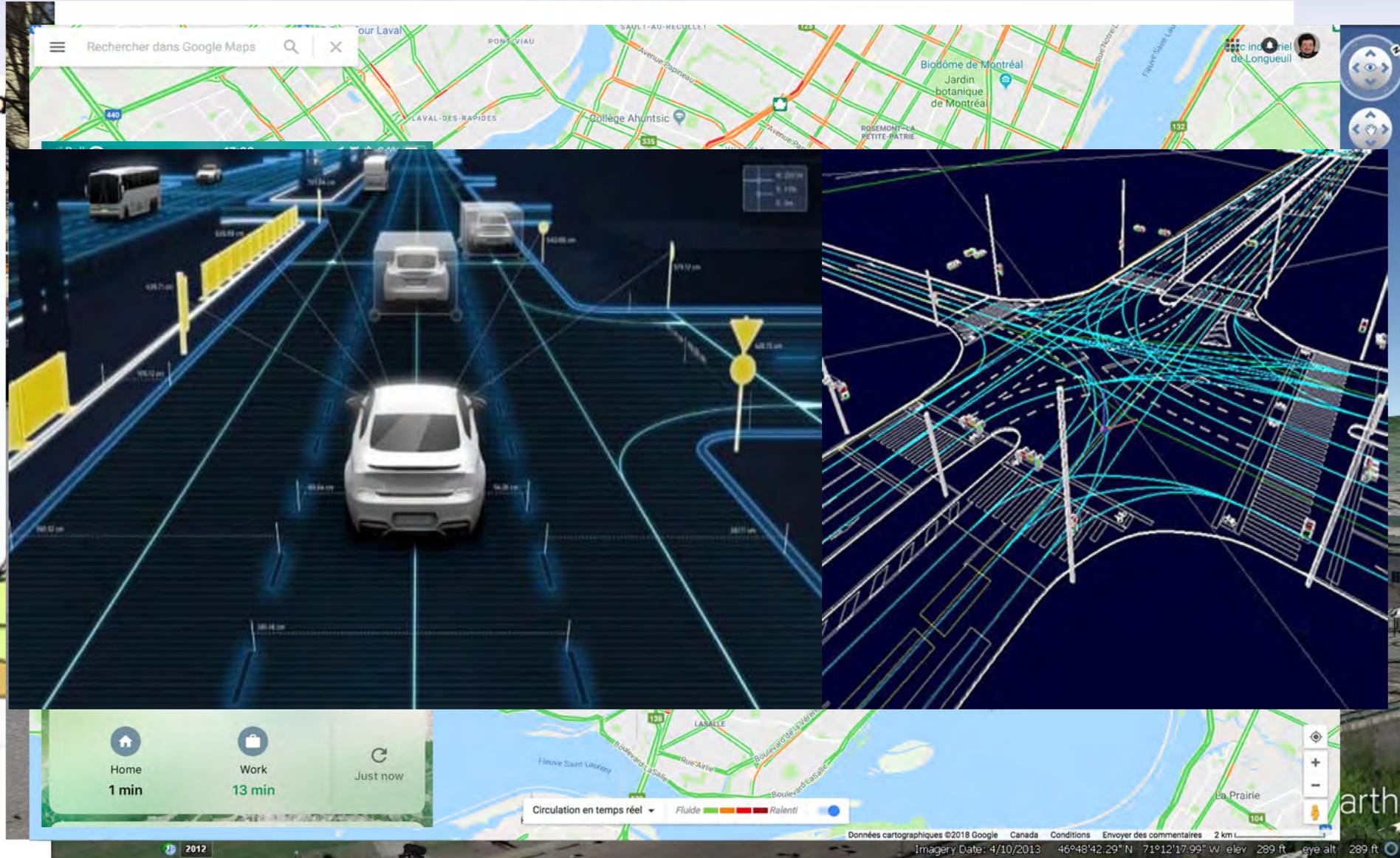
DE LA CARTE AU GEOSPATIAL



DE LA CARTE AU GEOSPATIAL



DE LA CARTE AU GEOSPATIAL



OK JE SITUE (SIC) MIEUX MAIS ...

Alors revenons à ce que vous connaissez
certainement mieux ...



PRISE DE DÉCISION - RAPPORTS

TopN Least Available

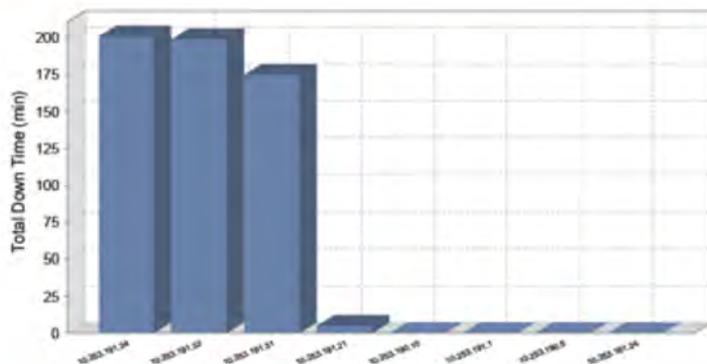
TopN least available managed assets

Summary

Report Period: Feb 01, 2006 12:00 AM to Feb 10, 2006 5:46 PM

Number of Elements Included: 10
 Availability Target: 99.000%
 Types of Outages Contributing to Downtime: Unplanned
 Business Day Policy: Full Day including Weekends

Availability Graph



Report Details

Name	IP Address	Type	Total Downtime	No. Of Outages	Availability %
10.253.191.34	10.253.191.34	Windows Host	03h 20m 50s	11	98.568%
10.253.191.32	10.253.191.32	Windows Host	03h 18m 39s	12	98.584%
10.253.191.31	10.253.191.31	Windows Host	02h 55m 05s	15	98.752%
10.253.191.21	10.253.191.21	Windows Host	00h 05m 00s	1	99.964%
10.253.190.10	10.253.190.10	RS-3000	00h 00m 00s	0	100.000%
10.253.191.1	10.253.191.1	Cisco/WSX5302	00h 00m 00s	0	100.000%
10.253.190.5	10.253.190.5	RS-3000	00h 00m 00s	0	100.000%
10.253.191.24	10.253.191.24	Windows Host	00h 00m 00s	0	100.000%

Pentaho Sample Report

JFreeReport



Steel Wheels, Inc.
 Human Resources Actual vs Forecast
 Period ending June 30, 2005

Region: Central

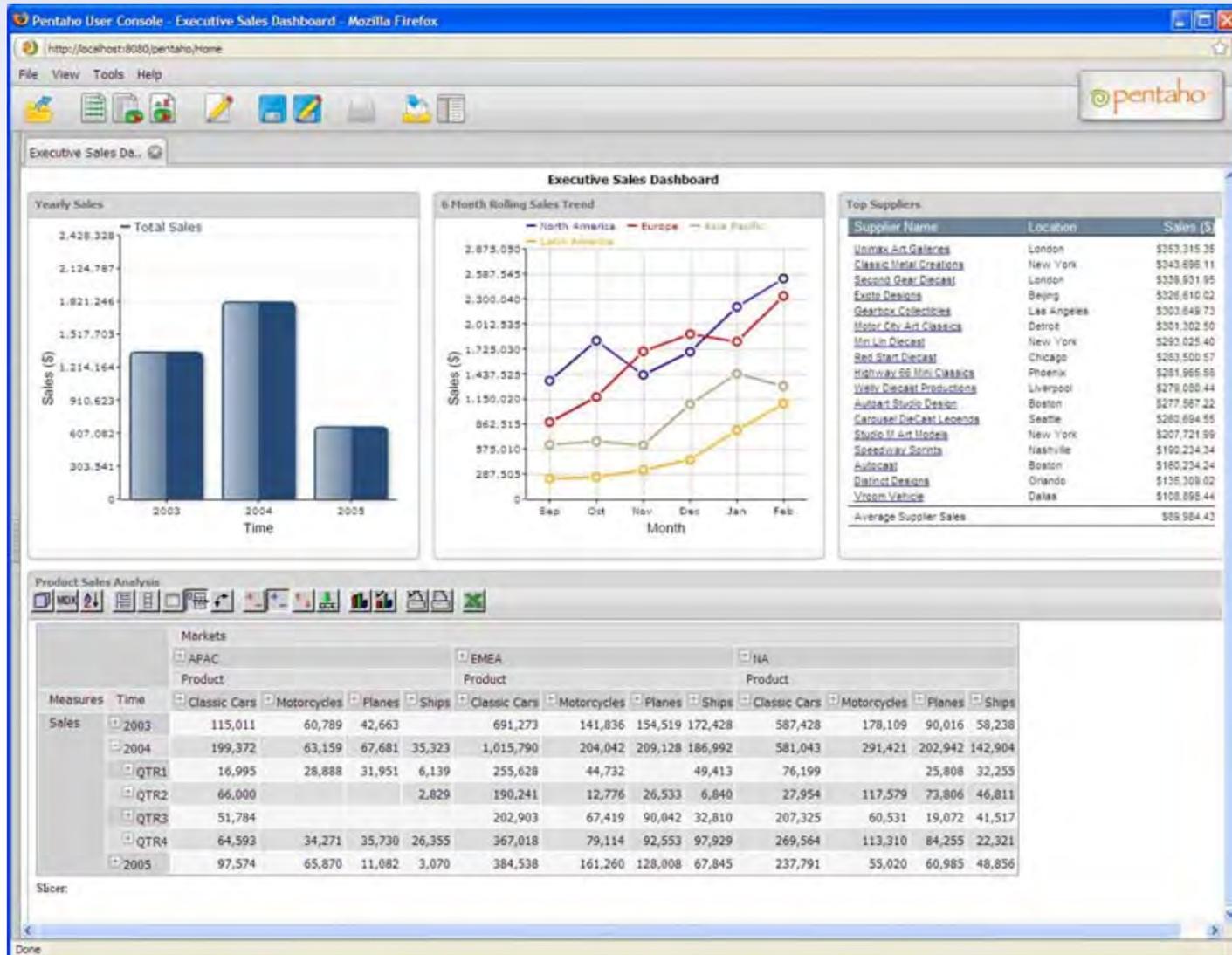
Department	Position	Actual	Budget	Variance
Executive Management				
	SVP Partnerships	\$367,415	\$392,100	\$24,685
	SVP WW Operations	\$476,000	\$725,887	\$249,887
	SVP Strategic Development	\$383,242	\$403,405	\$20,163
	CEO	\$549,625	\$522,250	-\$27,375
	Total	\$1,776,282	\$2,043,642	\$267,360

Department	Position	Actual	Budget	Variance
Finance				
	Controller	\$570,373	\$577,070	\$6,697
	Payroll	\$367,415	\$432,100	\$64,685
	Administrative Assistant	\$827,861	\$760,990	-\$66,871
	IS	\$570,759	\$577,346	\$6,587
	CFO	\$770,272	\$719,855	-\$50,417
	Total	\$3,106,680	\$3,067,361	-\$39,319

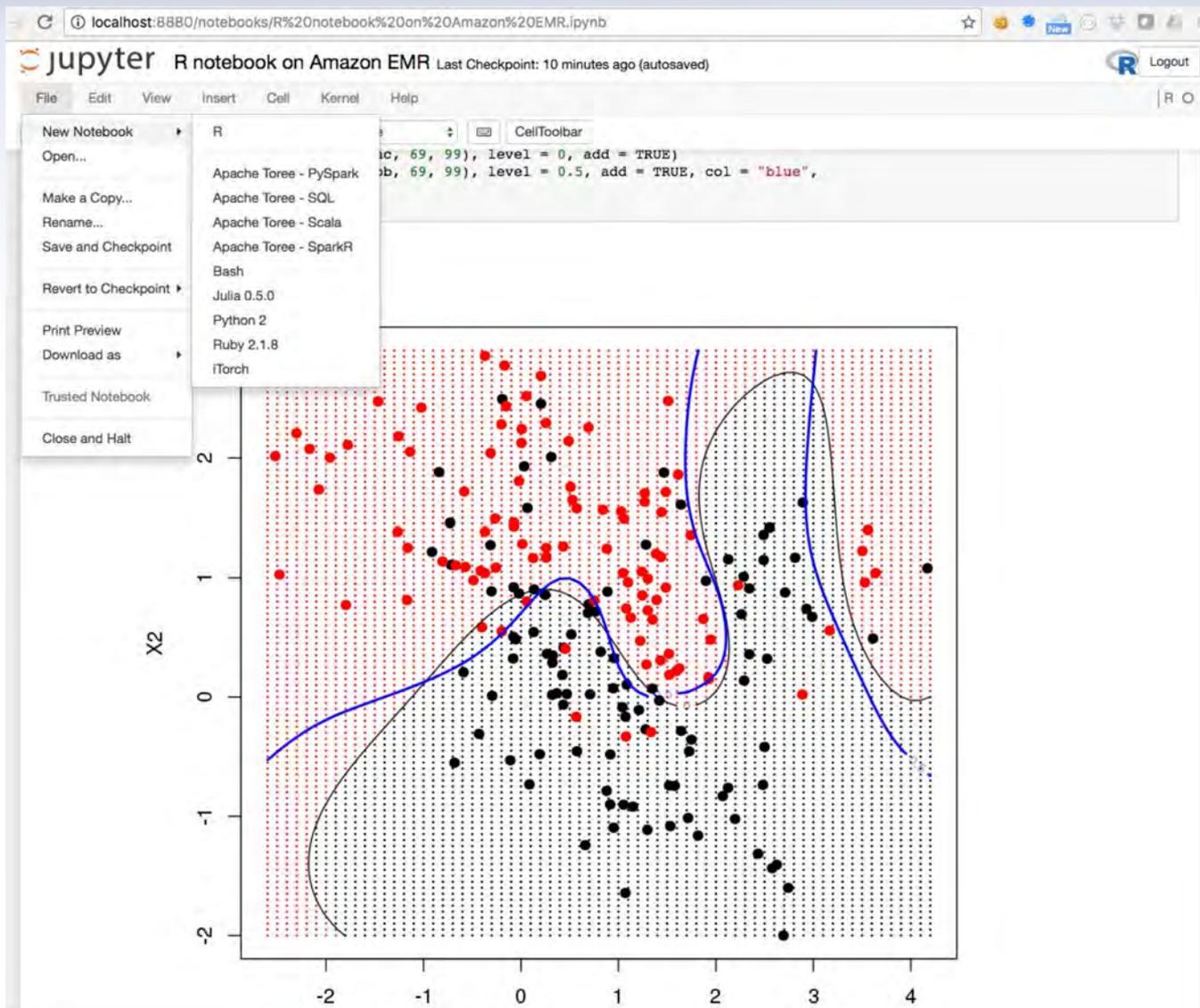
Department	Position	Actual	Budget	Variance
Human Resource				
	Sexual Harassment	\$530,473	\$538,570	\$8,097
	EOE	\$530,207	\$538,380	\$8,173
	HR Generalists	\$856,190	\$771,225	-\$84,965
	HR Training	\$397,473	\$443,570	\$46,097
	Administration	\$549,625	\$562,250	\$2,625
	SVP HR	\$574,895	\$570,300	-\$4,595
	Total	\$3,438,863	\$3,414,295	-\$24,568

Department	Position	Actual	Budget	Variance
Marketing & Communication				
	Graphics	\$782,375	\$728,500	-\$53,875
	Writer	\$405,985	\$459,650	\$53,665
	Analyst Relations	\$383,375	\$443,500	\$60,125
	Press Relations	\$497,296	\$524,672	\$27,376
	CMO	\$827,861	\$790,990	-\$36,871
	Product Marketing Mgr	\$693,531	\$665,040	-\$28,491

PRISE DE DÉCISION – TABLEAUX DE BORD



PRISE DE DÉCISION – DATA SCIENCE



PRISE DE DÉCISION – DATA SCIENCE

localhost:8880/notebooks/R%20notebook%20on%20Amazon%20EMR.ipynb
Jupyter R notebook on Amazon EMR Last Checkpoint: 10 minutes ago (autosaved) Logout

DATA

Which dataset do you want to use?



Ratio of training to test data: 50%



Noise: 0



Batch size: 10



REGENERATE

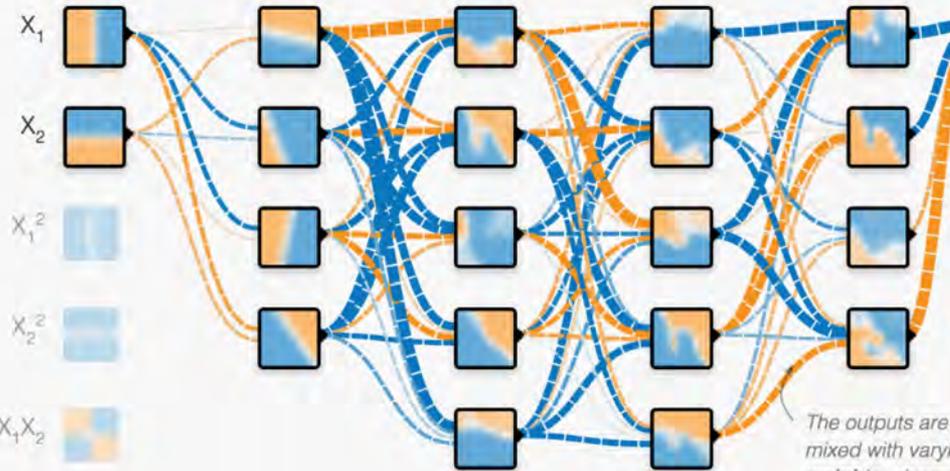
INPUT

Which properties do you want to feed in?

- X_1
- X_2
- X_1^2
- X_2^2
- $X_1 X_2$
- $\sin(X_1)$
- $\sin(X_2)$

+ - 4 HIDDEN LAYERS

+ - 4 neurons + - 5 neurons + - 5 neurons + - 4 neurons

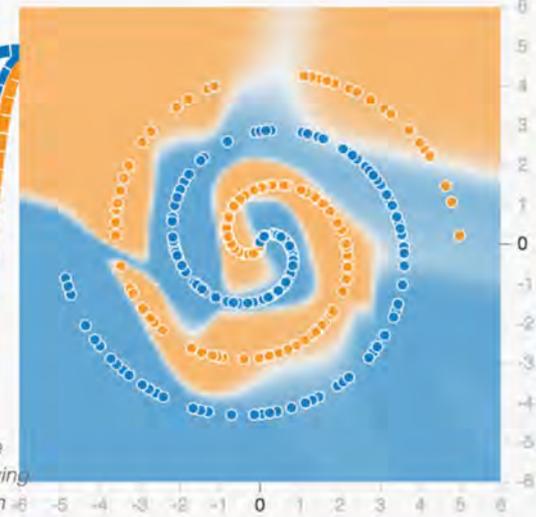


This is the output from one neuron. Hover to see it larger.

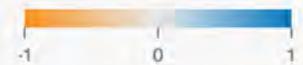
The outputs are mixed with varying weights, shown by the thickness of the lines.

OUTPUT

Test loss 0.086
Training loss 0.048



Colors shows data, neuron and weight values.



Show test data Discretize output

-2 -1 0 1 2 3 4

PRISE DE DÉCISION - RAPPORTS

TopN Least Available

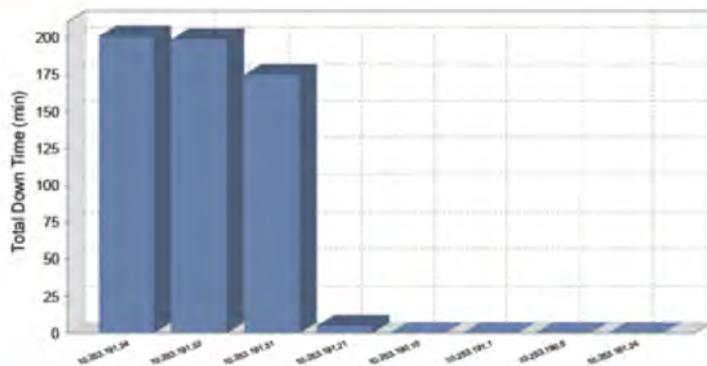
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10.253.191.1	10.253.191.1	Cisco/WSX5302	00h 00m 00s	0	100.000%
10.253.190.5	10.253.190.5	RS-3000	00h 00m 00s	0	100.000%
10.253.191.24	10.253.191.24	Windows Host	00h 00m 00s	0	100.000%

Pentaho Sample Report
 JFreeReport

Steel Wheels

Steel Wheels, Inc.
 Human Resources Actual vs Forecast
 Period ending June 30, 2005

Region: Central

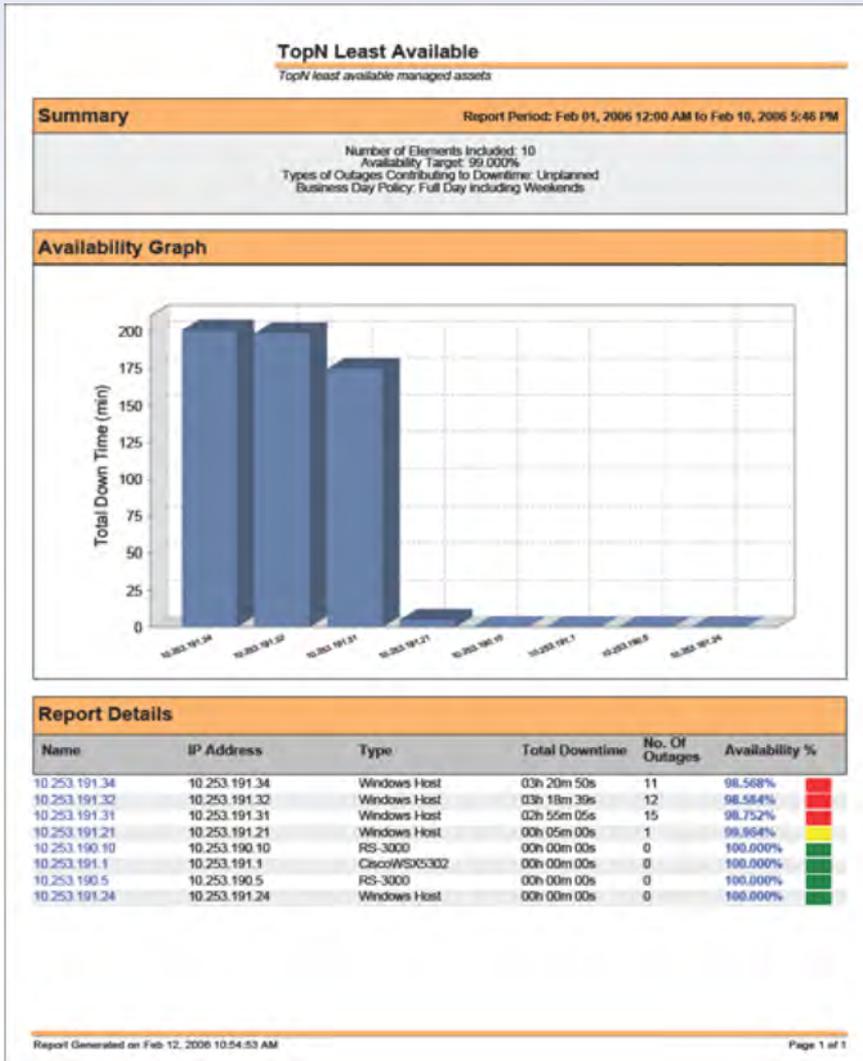
Department	Position	Actual	Budget	Variance
Executive Management				
SVP Partnerships		\$397,415	\$392,100	\$24,695
SVP WW Operations		\$476,000	\$725,887	\$249,887
SVP Strategic Development		\$383,242	\$403,405	\$20,163
CEO		\$549,625	\$522,250	-\$27,375
Total		\$1,776,282	\$2,043,642	\$267,360

Department	Position	Actual	Budget	Variance
Finance				
Controller		\$570,373	\$577,070	\$6,697
Payroll		\$367,415	\$432,100	\$64,695
Administrative Assistant		\$827,861	\$780,990	-\$96,871
IS		\$570,759	\$577,346	\$6,587
CFO		\$770,272	\$719,855	-\$50,417
Total		\$3,106,680	\$3,067,361	-\$39,319

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Human Resource				
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HR Generalists		\$856,190	\$771,225	-\$84,965
HR Training		\$397,473	\$443,570	\$46,097
Administration		\$549,625	\$552,250	\$2,625
SVP HR		\$574,895	\$570,300	-\$4,595
Total		\$3,438,863	\$3,414,295	-\$24,568

Department	Position	Actual	Budget	Variance
Marketing & Communication				
Graphics		\$782,375	\$728,500	-\$53,675
Writer		\$405,985	\$459,650	\$53,665
Analyst Relations		\$383,375	\$443,500	\$60,125
Press Relations		\$497,296	\$524,672	\$27,576
CMO		\$827,861	\$780,990	-\$96,871
Product Marketing Mgr		\$693,531	\$665,040	-\$28,491

PRISE DE DÉCISION - RAPPORTS



Pentaho Sample Report
_FreeReport

Steel Wheels Steel Wheels, Inc.
Human Resources Actual vs Forecast
Period ending June 30, 2005

Region: Central

Department	Actual	Budget	Variance
	\$387,415	\$392,100	\$24,685
	\$476,000	\$725,887	\$249,887
	\$383,242	\$403,405	\$20,163
CEO	\$549,625	\$522,250	-\$27,375
Total	\$1,776,282	\$2,043,642	\$267,360

Department Finance

Position	Actual	Budget	Variance
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Payroll	\$367,415	\$432,100	\$64,685
Administrative Assistant	\$827,861	\$780,990	-\$46,871
IS	\$570,759	\$577,346	\$6,587
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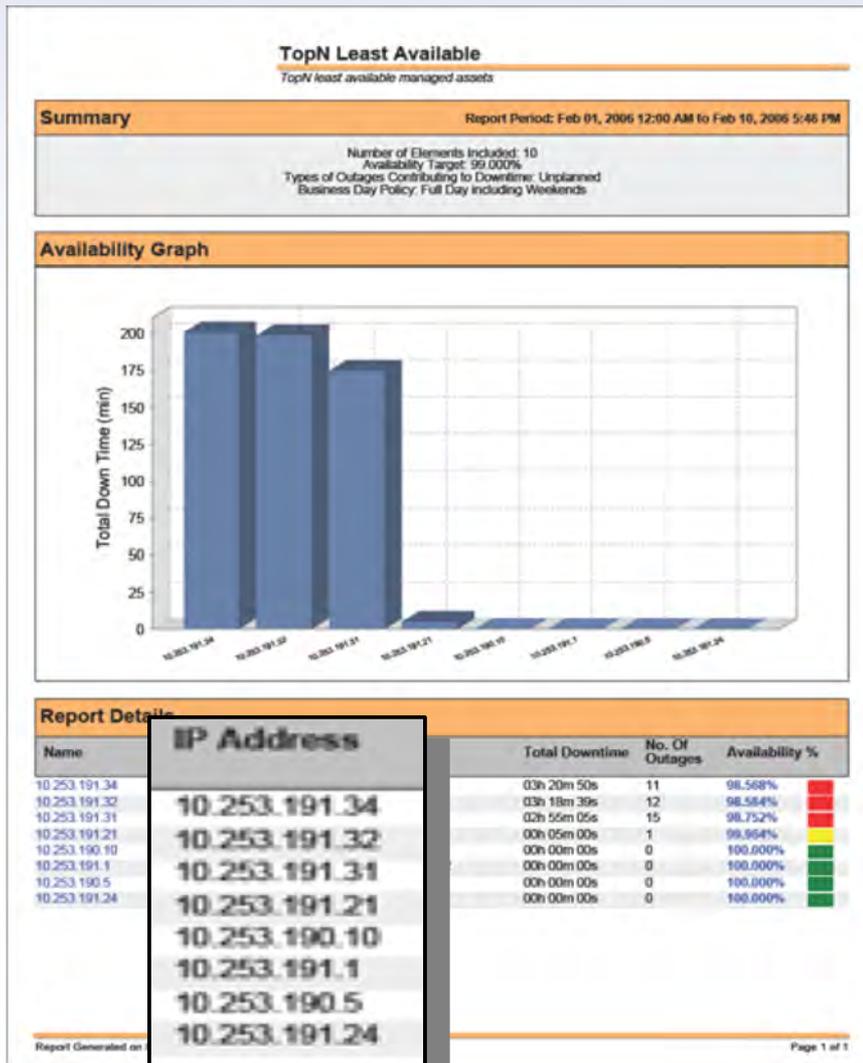
Department Human Resource

Position	Actual	Budget	Variance
Sexual Harassment	\$530,473	\$538,570	\$8,097
EOE	\$530,207	\$538,380	\$8,173
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Department Marketing & Communication

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Analyst Relations	\$383,375	\$443,500	\$60,125
Press Relations	\$497,296	\$524,672	\$27,376
CMO	\$827,861	\$780,990	-\$46,871
Product Marketing Mgr	\$693,531	\$665,040	-\$28,491

PRISE DE DÉCISION - RAPPORTS



Pentaho Saris Report
_FreeReport

Steel  Wheels
 Steel Wheels, Inc.
 Human Resources Actual vs Forecast
 Period ending June 30, 2005

Region: Central

Department	Actual	Budget	Variance
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	\$476,000	\$725,887	\$249,887
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HR Training	\$397,473	\$443,570	\$46,097
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Position	Actual	Budget	Variance
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Press Relations	\$497,296	\$524,672	\$27,376
CMO	\$827,861	\$780,990	-\$46,871
Product Marketing Mgr	\$690,531	\$665,040	-\$25,491

PRISE DE DÉCISION - RAPPORTS



Pentaho Sample Report
_FreeReport

Steel Wheels, Inc.
Human Resources Actual vs Forecast
Period ending June 30, 2005

Region: Central

	Actual	Budget	Variance
Department: Prod	\$387,415	\$392,100	\$24,685
	\$476,000	\$725,887	\$249,887
	\$383,242	\$403,405	\$20,163
CEO	\$549,625	\$522,250	-\$27,375

GEO IP TOOL

Report Details

Name	IP Address	Total
10.253.191.34	10.253.191.34	03h 2
10.253.191.32	10.253.191.32	03h 1
10.253.191.31	10.253.191.31	02h 5
10.253.191.21	10.253.191.21	00h 0
10.253.190.10	10.253.190.10	00h 0
10.253.191.1	10.253.191.1	00h 0
10.253.190.5	10.253.190.5	00h 0
10.253.191.24	10.253.191.24	00h 0

Report Generated on

Regardez mon information d'IP | Plus d'information au sujet d'IPS | Firefox Plugin | Now online | Dans votre site Web

Free Log File Analyzer
Search, Alert and Monitor ALL Your IT data.
Free Download!

Host / IP: voir d'information

Nom d'hôte: 192.33.147.30
Adresse IP: 192.33.147.30
Pays: France
Code de pays: FR (FRA)
Région: Ile-de-France
Ville: Saint-mandé
Code postal:
Indicatif tél.: +33
Longitude: 2.4167
Latitude: 48.8333

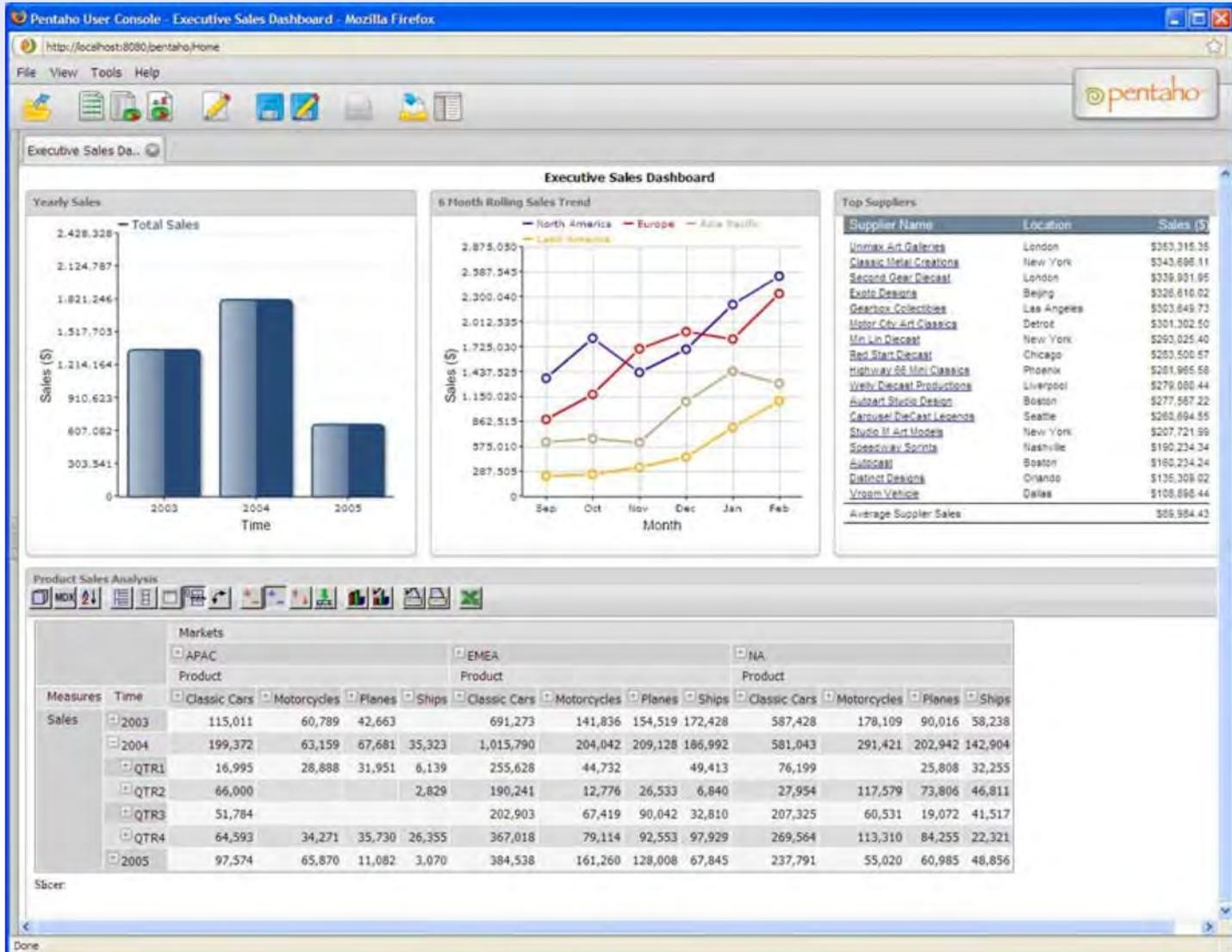
New outil for your site Web!

Plan | Satellite | Mixte

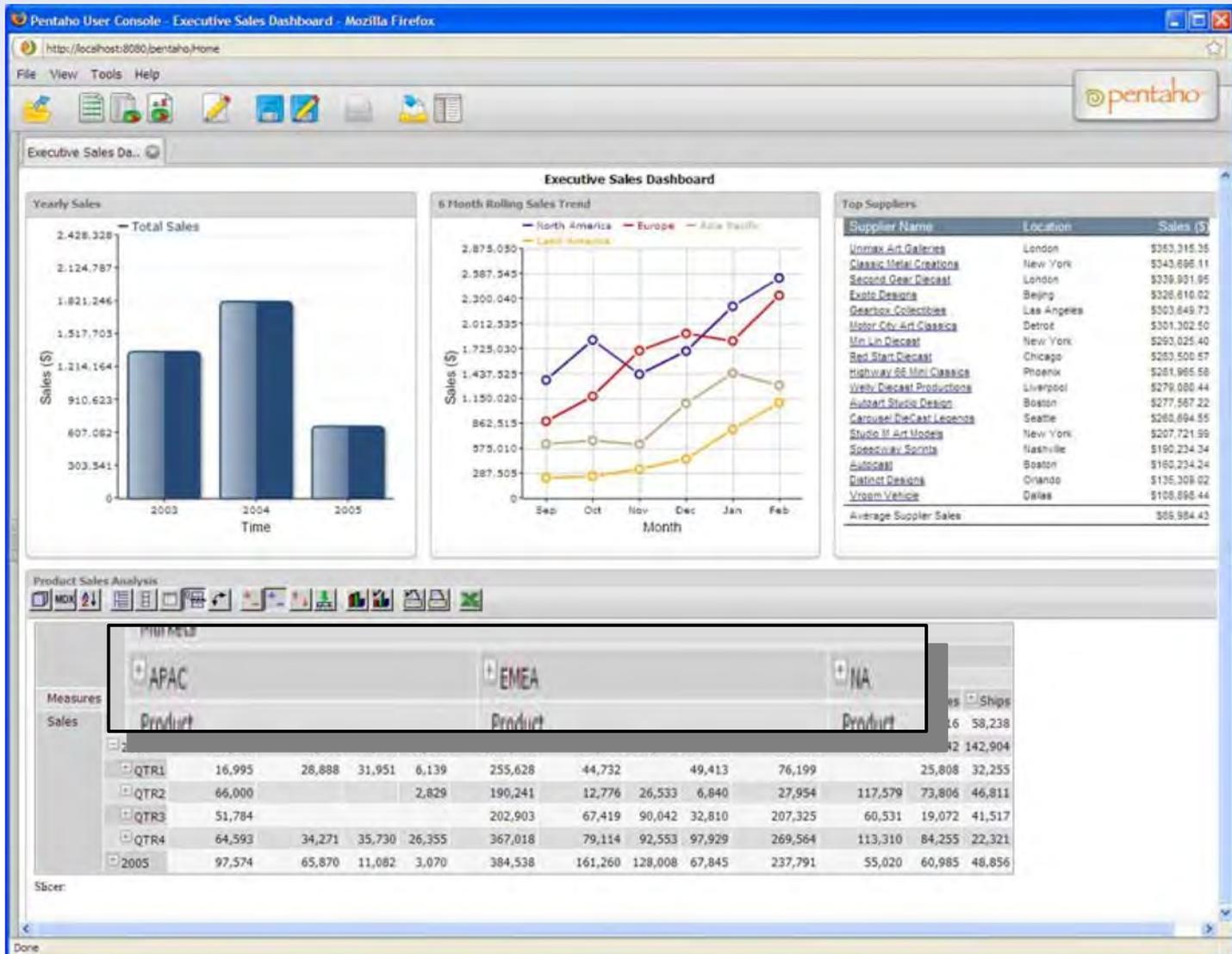
Powered by Google

Surveillance Cambriolage | Ip Address Locator
Alarme Habitations et Entreprises Demandez Find Ip Address Locators at Great Prices.
maintenant Infos en ligne! www.Pronto.com

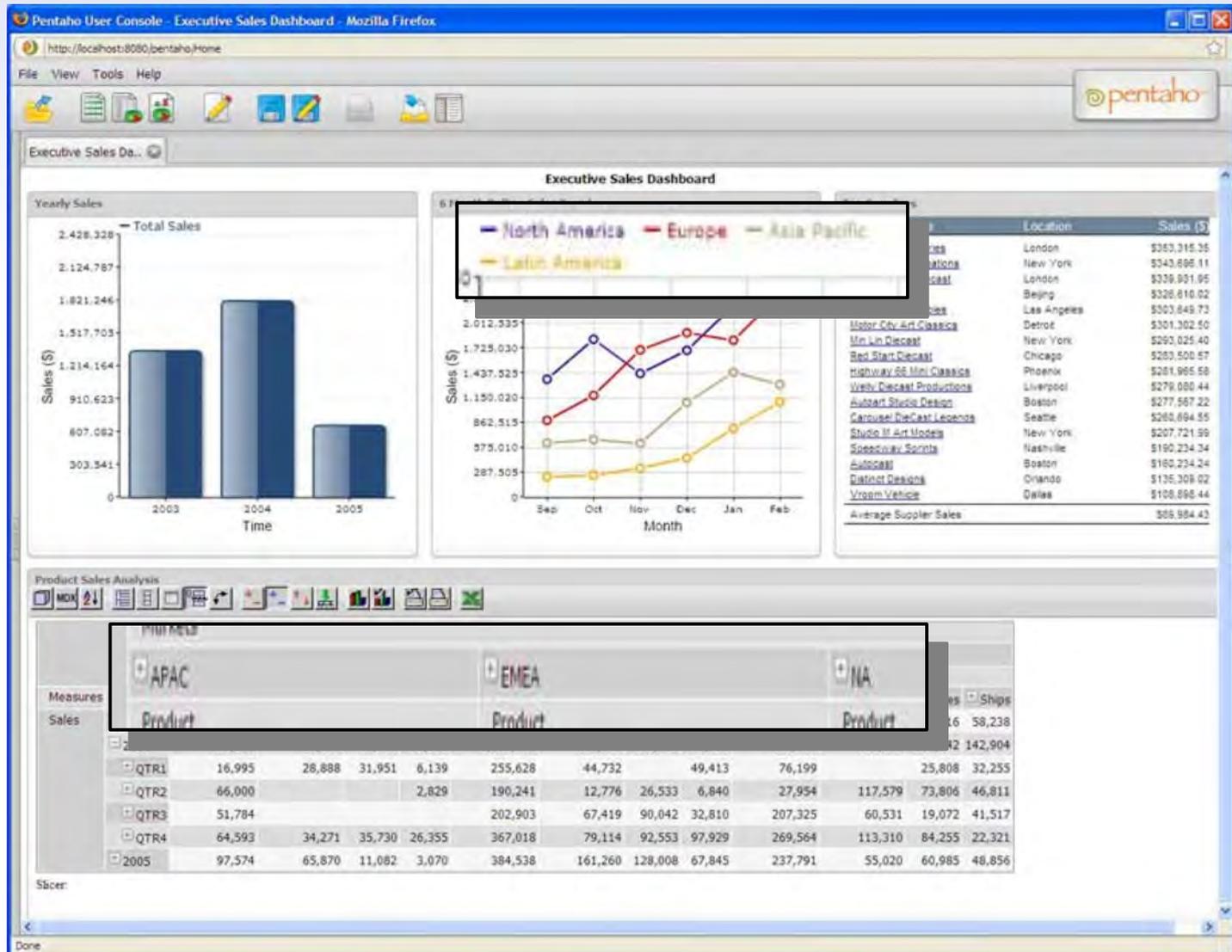
PRISE DE DÉCISION – TABLEAUX DE BORD



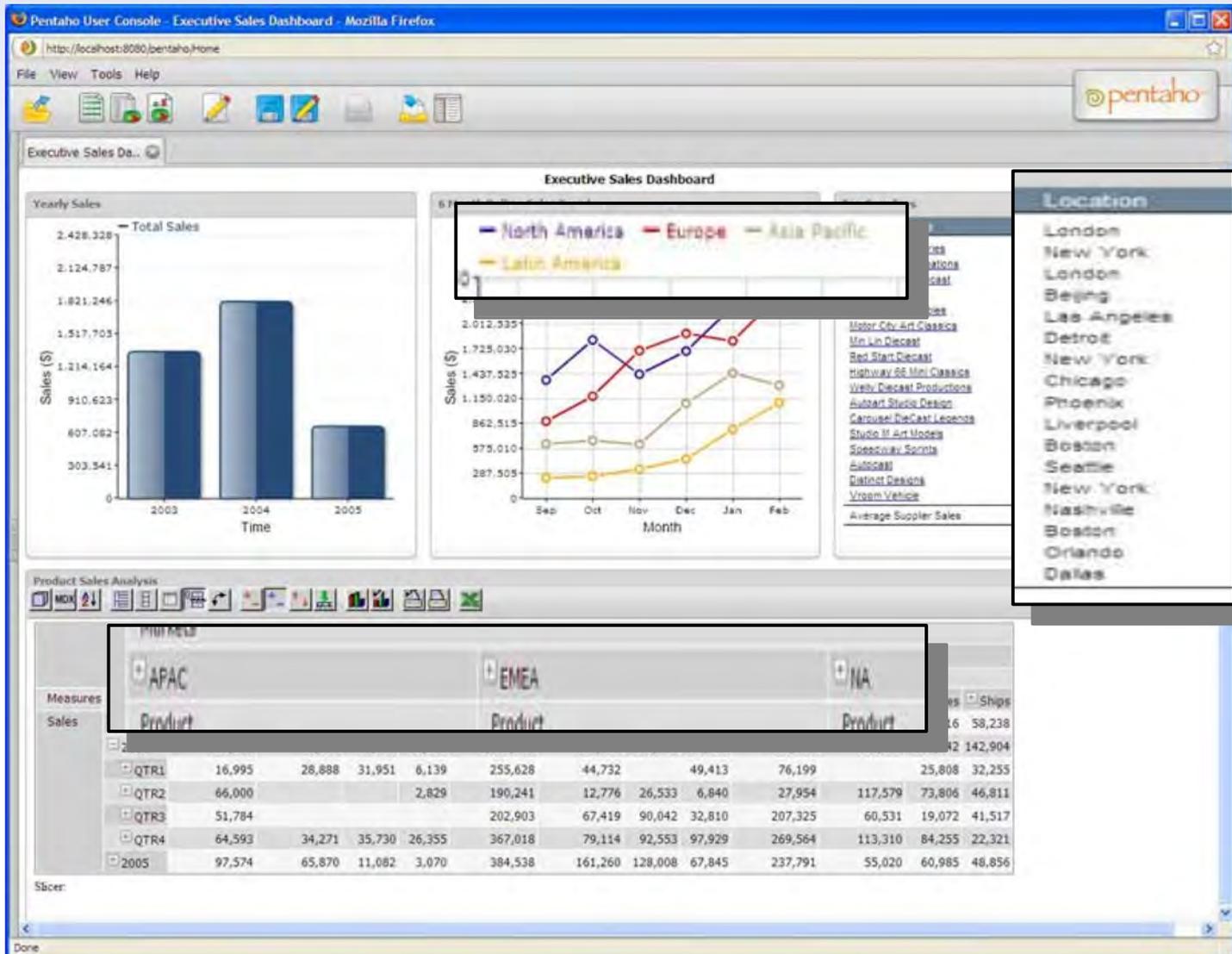
PRISE DE DÉCISION – TABLEAUX DE BORD



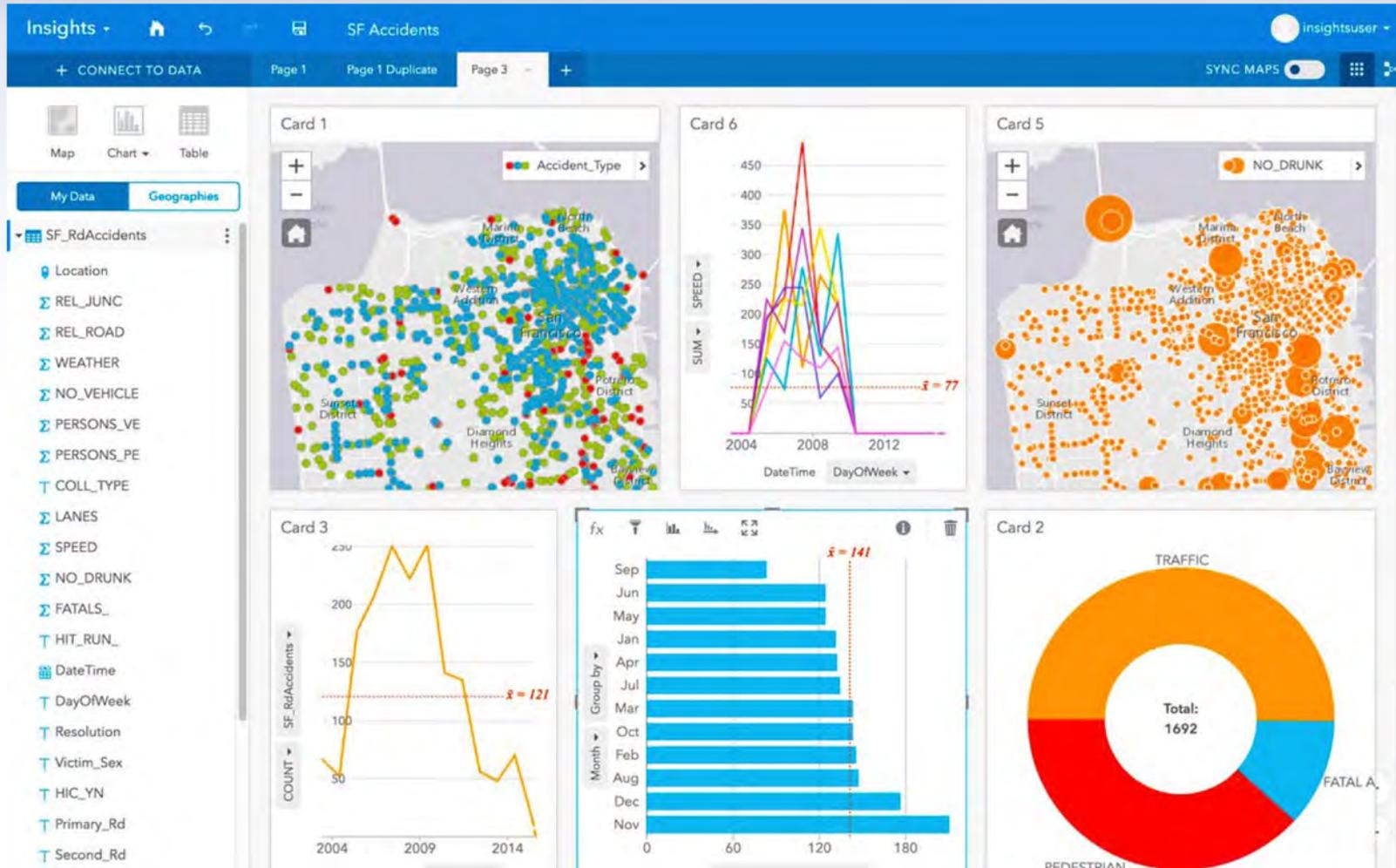
PRISE DE DÉCISION – TABLEAUX DE BORD



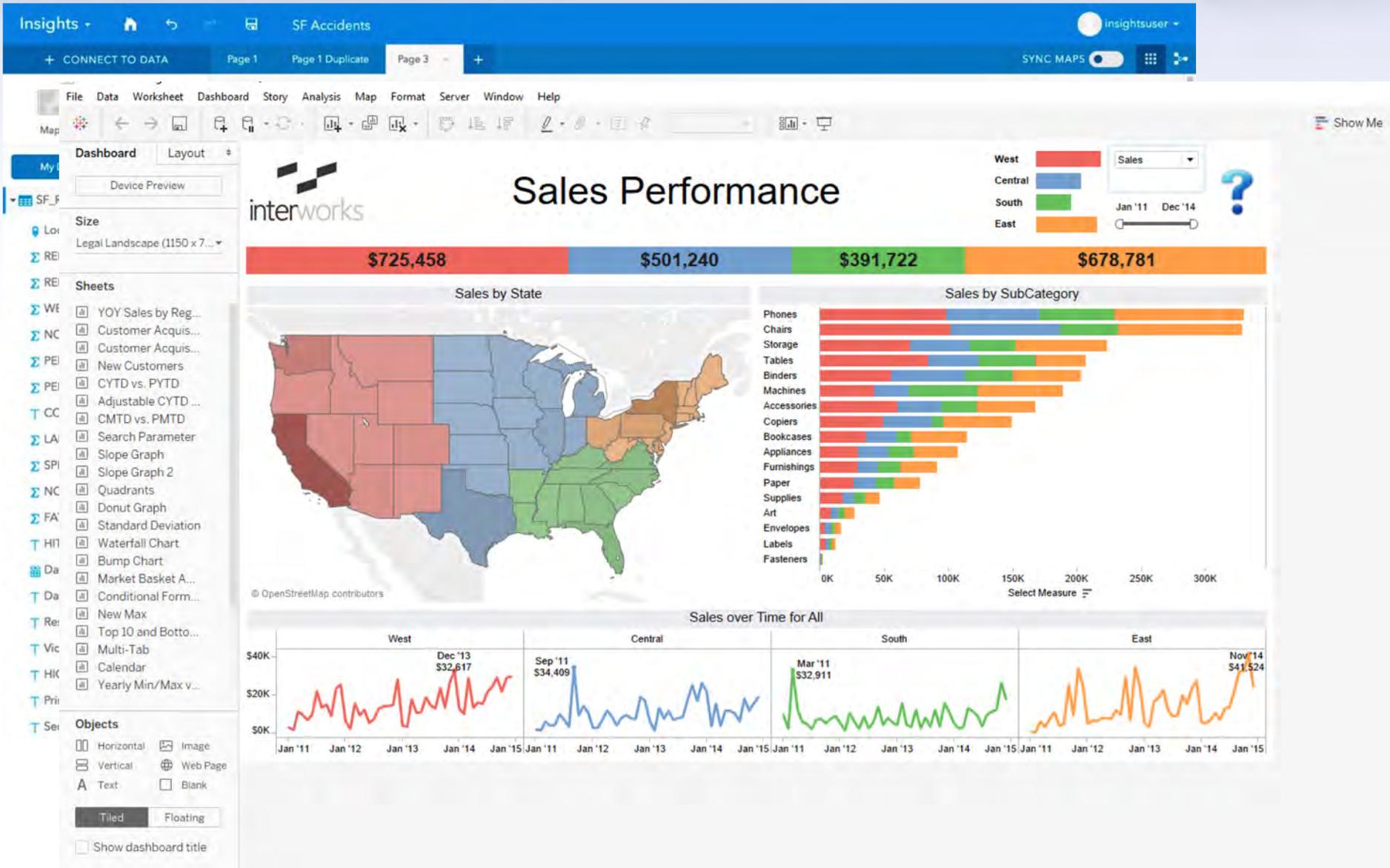
PRISE DE DÉCISION – TABLEAUX DE BORD



PRISE DE DÉCISION – CARTO. THEMATIQUE



PRISE DE DÉCISION – CARTO. THEMATIQUE



The Economist

FEBRUARY 27TH - MARCH 5TH 2010

Economist.com

Obama the warrior

Misgoverning Argentina

The economic shift from West to East

Genetically modified crops blossom

The right to eat cats and dogs

The data deluge

AND HOW TO HANDLE IT: A 14-PAGE SPECIAL REPORT



VISUALISATION CARTOGRAPHIQUE

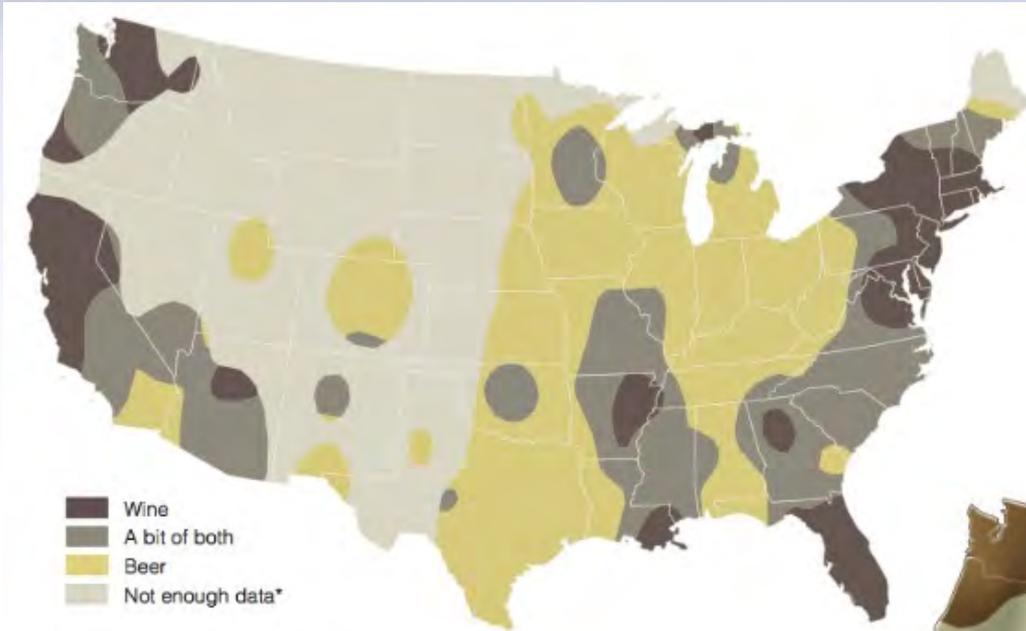


Fig. 17.1 The geographies of wine and beer tweets

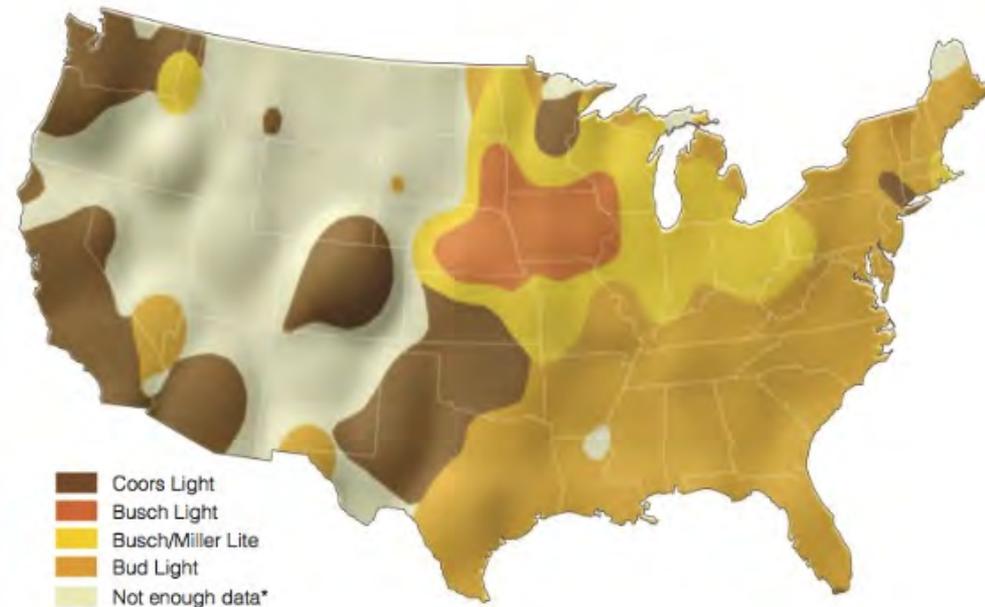
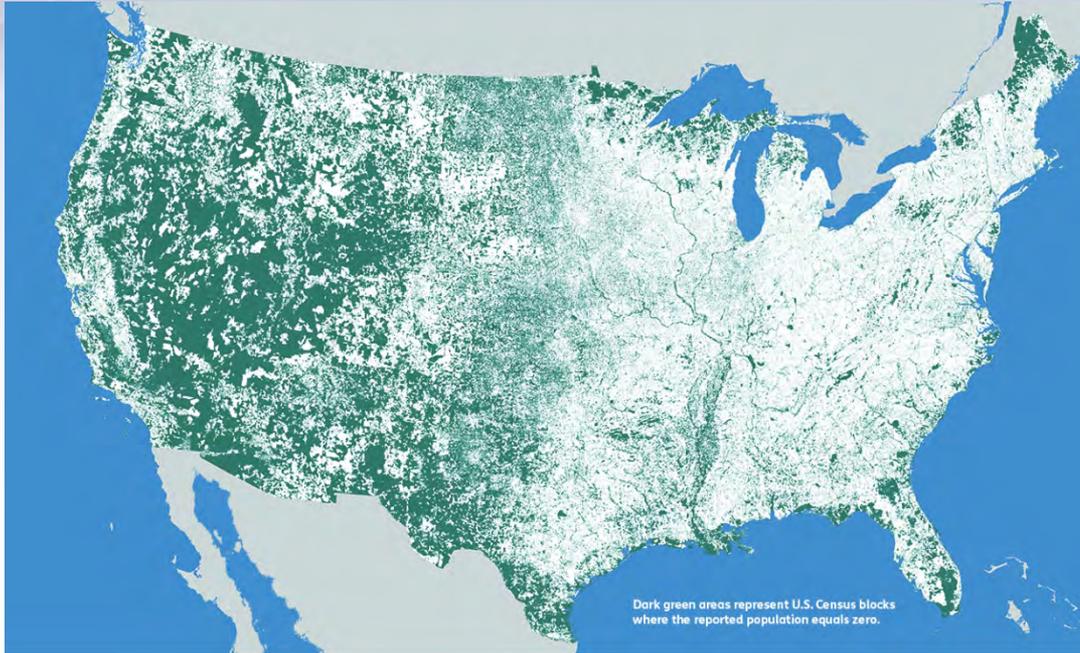


Fig. 17.2 The geographies of light beer tweets

VISUALISATION CARTOGRAPHIQUE



NOBODY LIVES HERE

The 4,871,270 U.S. Census Blocks with zero population
(2010)

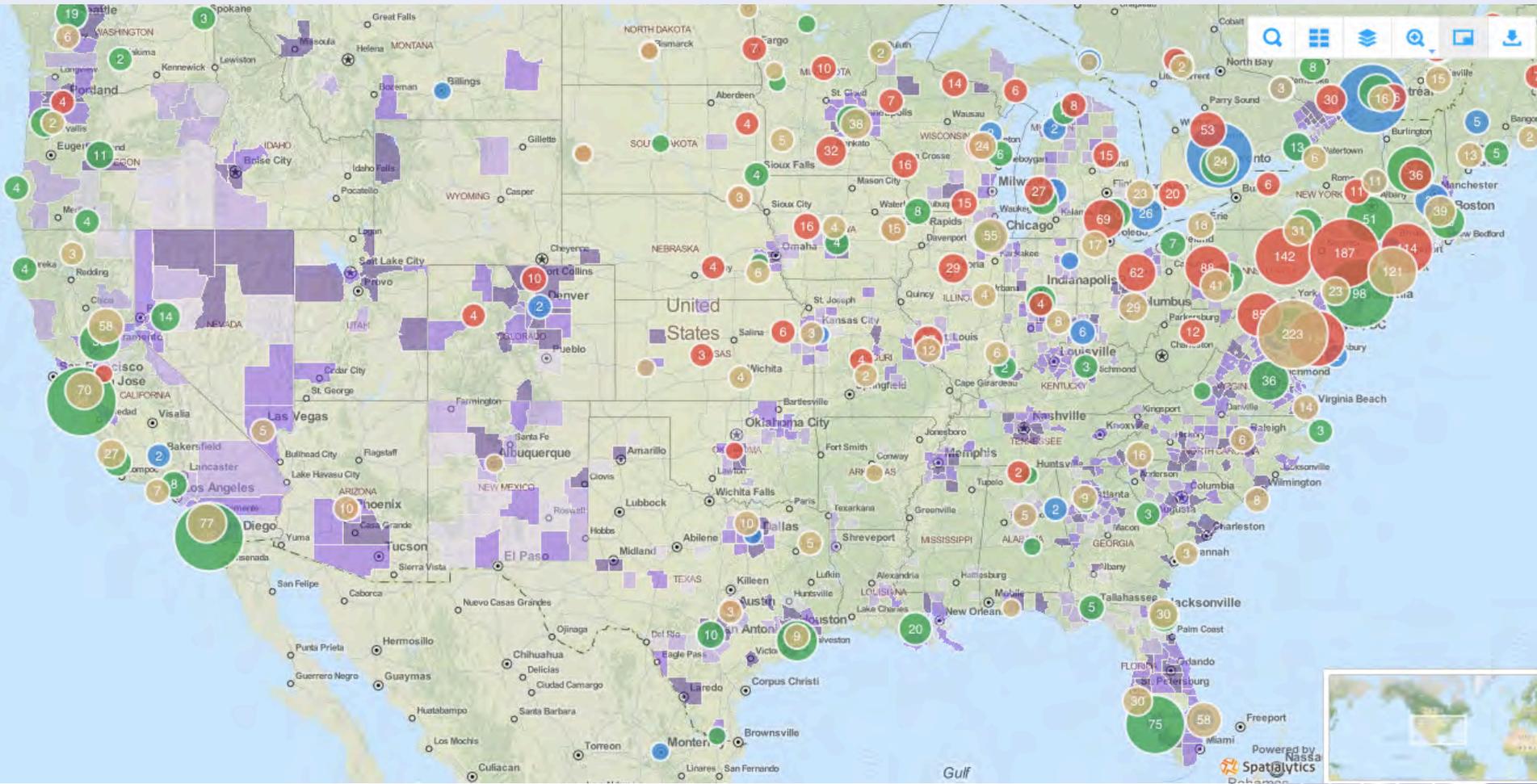


© nik.freeman 2014, mapsbynik.com
Creative Commons Attribution-NonCommercial-ShareAlike
Block geography and population data from U.S. Census Bureau
Water body geography from National Hydrology Dataset and Natural Earth
Made with Tilemill
USGS National Atlas Equal Area Projection

Source : <http://m.theatlanticcities.com/neighborhoods/2014/04/map-all-places-us-where-nobody-lives/8910/>

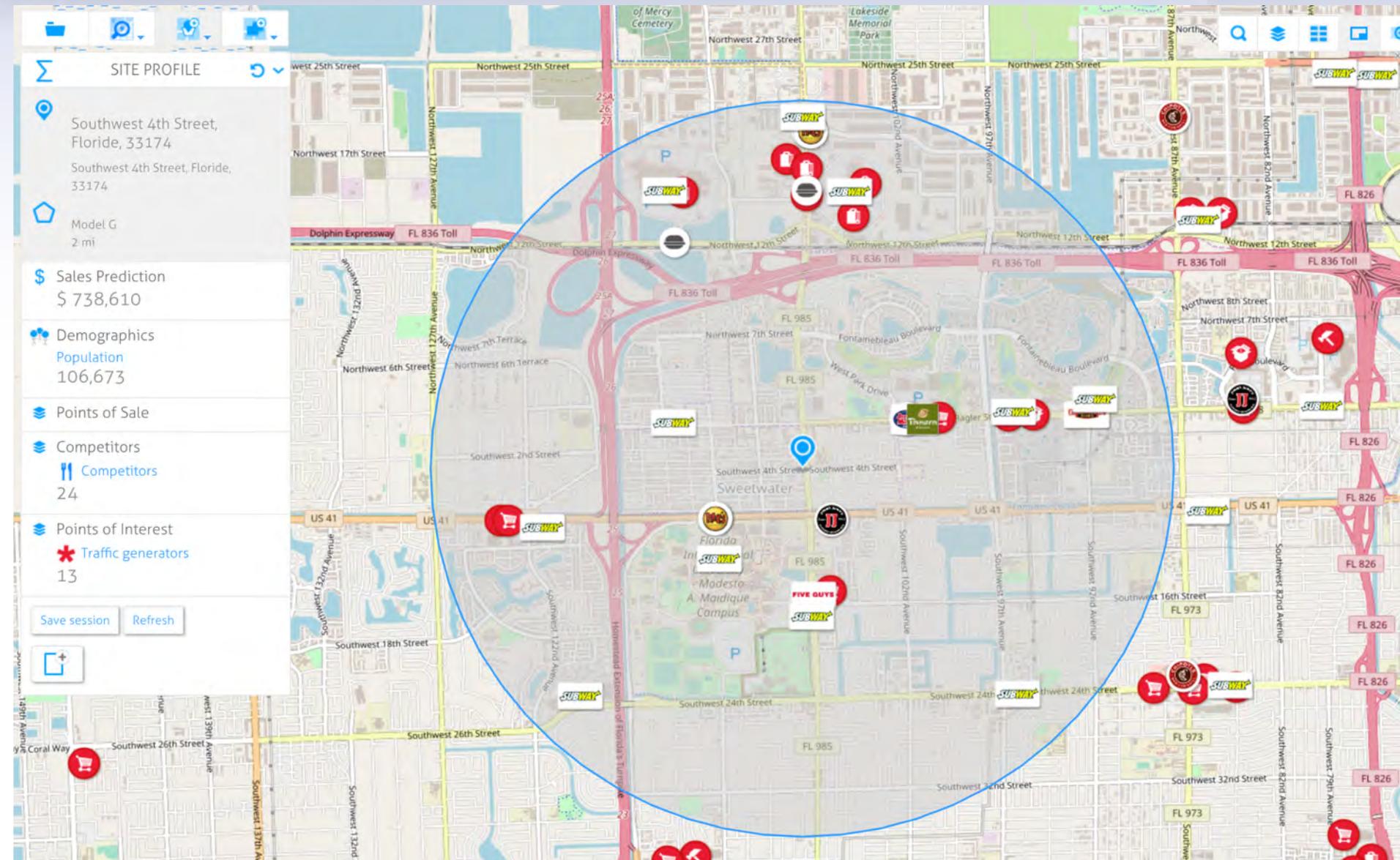


VISUALISATION CARTOGRAPHIQUE

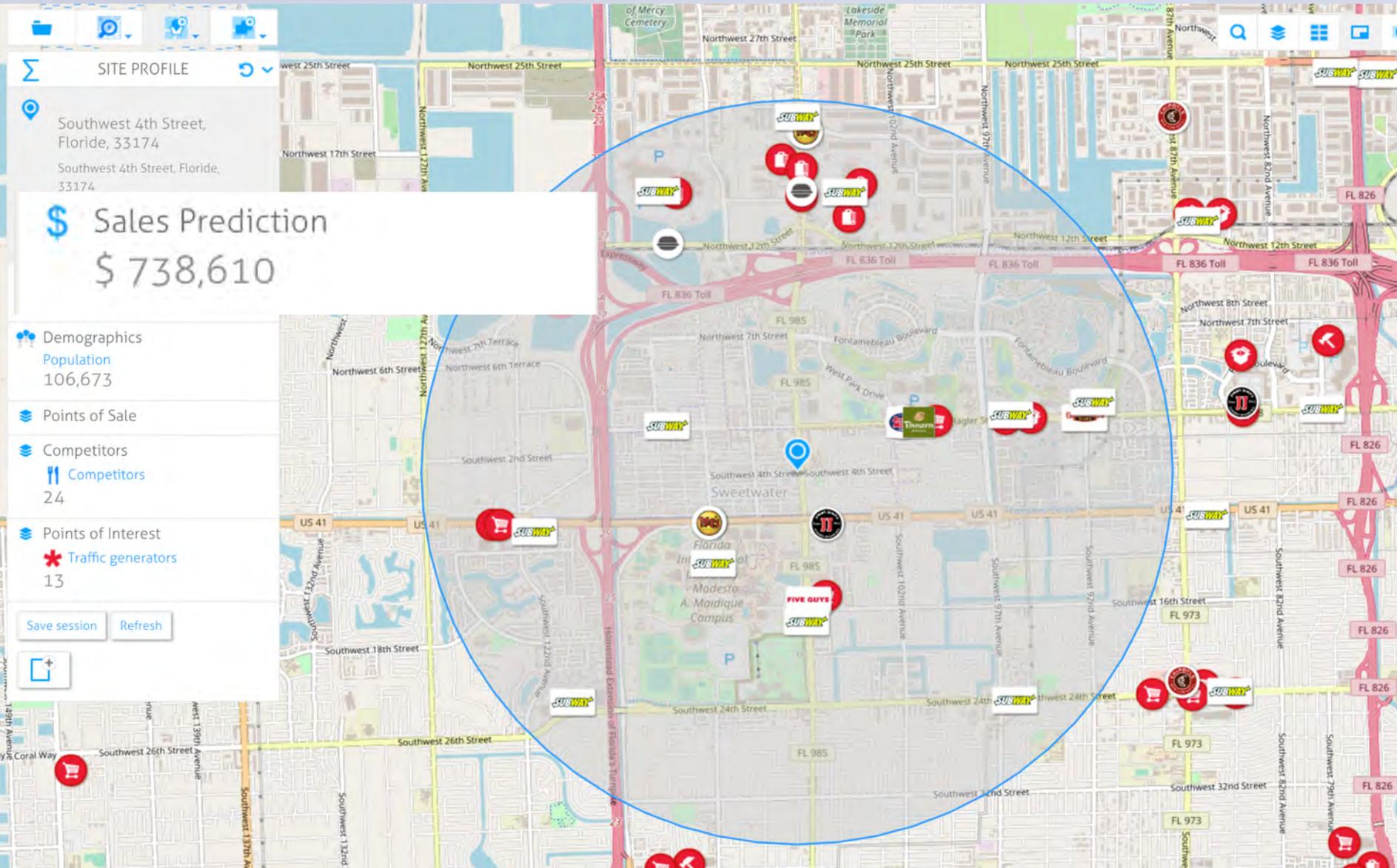


Source : Spatialetics

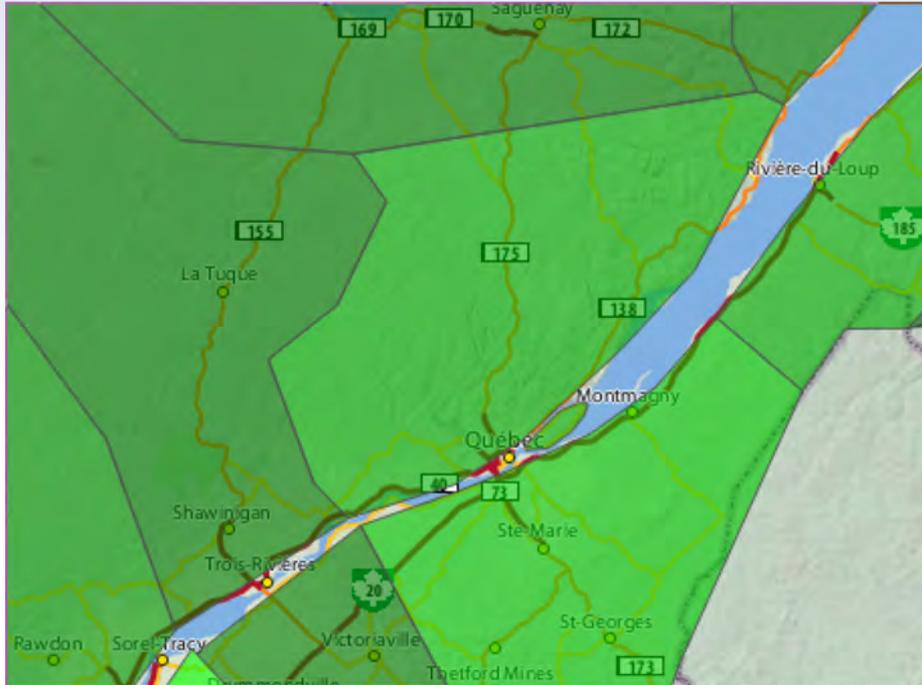
EN AJOUTANT DE L'APPRENTISSAGE ...



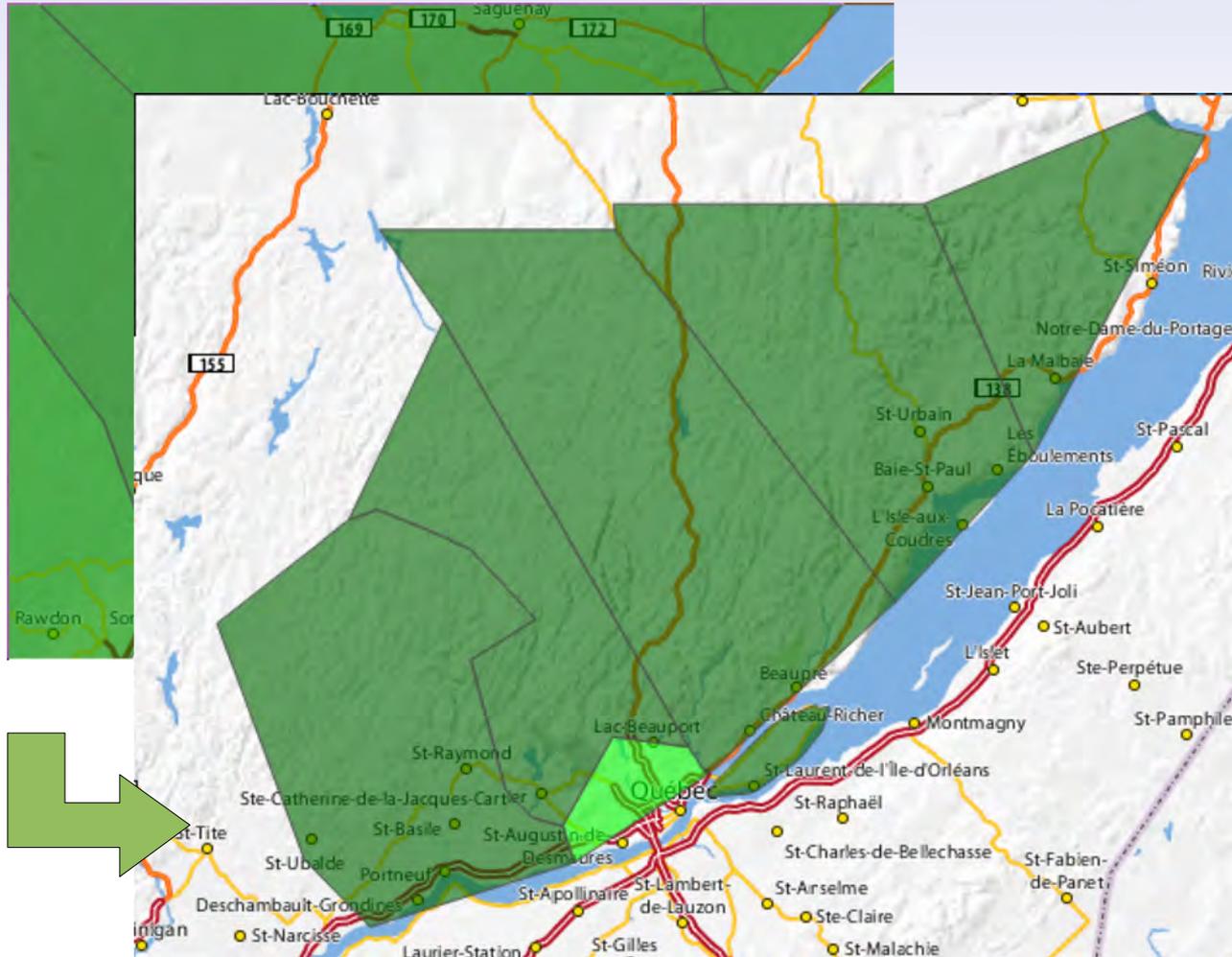
EN AJOUTANT DE L'APPRENTISSAGE ...



ANALYSE – RELATIONS SPATIALES



ANALYSE – RELATIONS SPATIALES



ANALYSE – RELATIONS SPATIALES



VISUALISATION DE DONNÉES MASSIVES



Source : <http://www.keywebmetrics.com/2013/07/big-data-visualizations/>

LA CARTE ...

- Un médium de communication intuitif
 - Tout le monde la comprend, se situe et en appréhende les relations entre entités (proximité, densité, forme, intensité, ...)
- Permet de croiser/superposer différentes informations et de faire les liens entre les couches de données
 - Moyen de découvrir de nouvelle information ...
- Visualisation de données complexes et des relations
- Navigation intuitive au sein de l'information (cf. Google Maps/Earth)
- Un médium assez universel
 - “80 % of all data stored in corporate databases has a spatial component” [Franklin 1992]



BIG DATA : LE GEOSPATIAL EST LÀ !

	Manufacturing and Natural Resources	Media/ Communications	Services	Government	Education	Retail	Banking	Insurance	Healthcare	Transportation	Utilities
Transactions	73%	62%	67%	67%	54%	93%	83%	81%	75%	79%	80%
Log data	44%	57%	58%	59%	54%	40%	66%	61%	33%	71%	60%
Machine or sensor data	53%	38%	35%	33%	31%	27%	27%	48%	42%	50%	40%
Emails /documents	27%	43%	43%	41%	46%	27%	34%	39%	17%	29%	20%
Social media data	32%	52%	39%	26%	54%	73%	27%	13%	-	50%	-
Free-form text	17%	24%	28%	30%	31%	20%	34%	35%	67%	21%	40%
Geospatial data	27%	14%	19%	19%	38%	27%	27%	26%	8%	29%	40%
Images	19%	24%	17%	11%	38%	13%	5%	16%	25%	7%	-
Video	8%	29%	12%	7%	31%	13%	-	6%	8%	7%	-
Audio	10%	19%	8%	4%	8%	-	-	6%	-	-	-
Other	8%	14%	13%	15%	8%	7%	10%	16%	42%	14%	-
n =	59	21*	127	27*	13*	15*	41	31	12*	14*	5*

BIG DATA : LE GEOSPATIAL EST LÀ !

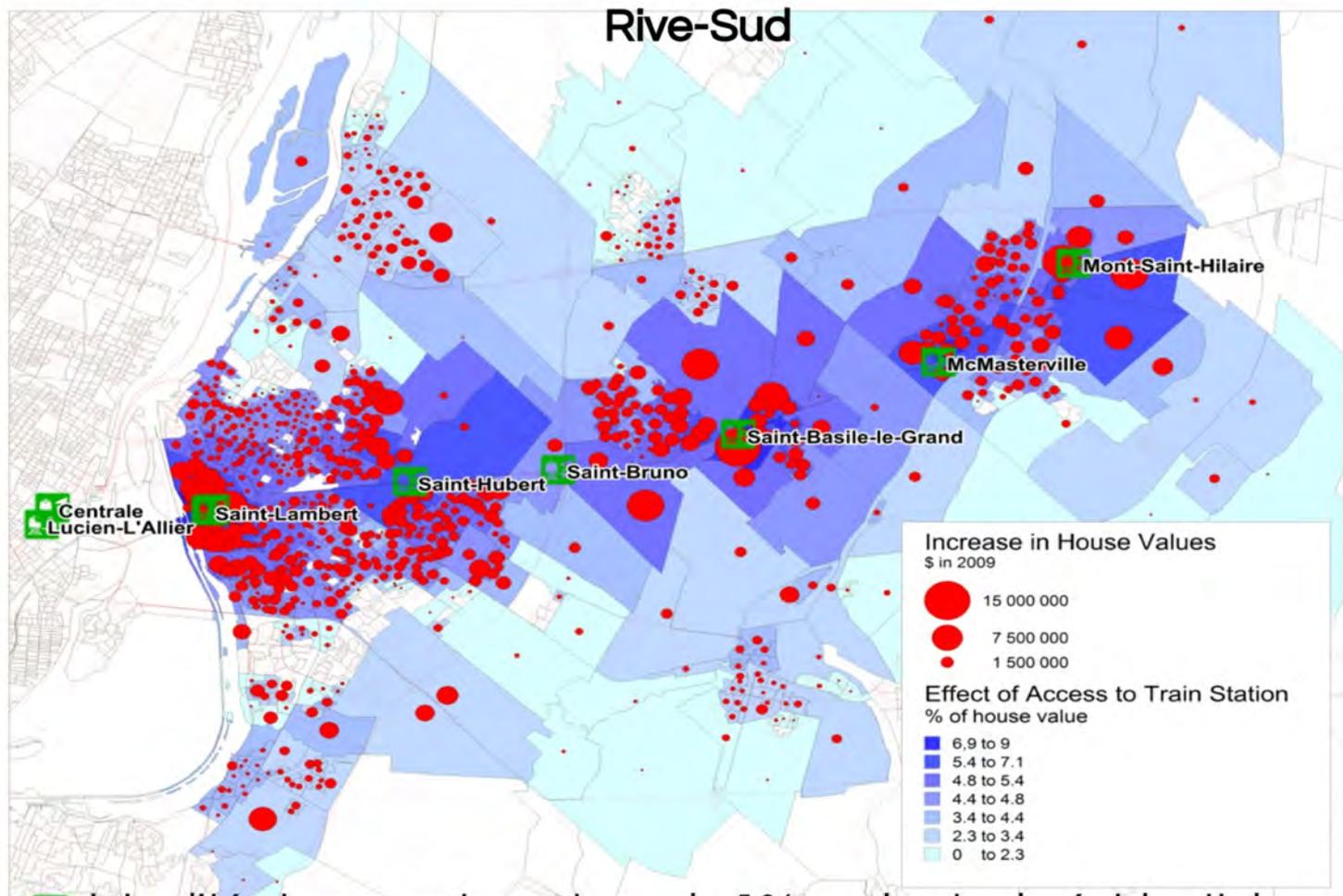
	Manufacturing and Natural Resources	Media/ Communications	Services	Government	Education	Retail	Banking	Insurance	Healthcare	Transportation	Utilities
Transactions	73%	62%	67%	67%	54%	93%	83%	81%	75%	79%	80%
Log data	44%	57%	58%	59%	54%	40%	66%	61%	33%	71%	60%
Machine or sensor data	53%	38%	35%	33%	31%	27%	27%	48%	42%	50%	40%
Emails /documents	27%	43%	43%	41%	46%	27%	34%	39%	17%	29%	20%
Social media data	32%	52%	39%	26%	54%	73%	27%	13%	-	50%	-
Free-form text	17%	24%	28%	30%	31%	20%	34%	35%	67%	21%	40%
Geospatial data	27%	14%	19%	19%	38%	27%	27%	26%	8%	29%	40%
Images	19%	24%	17%	11%	38%	13%	5%	16%	25%	7%	-
Video	8%	29%	12%	7%	31%	13%	-	6%	8%	7%	-
Audio	10%	19%	8%	4%	8%	-	-	6%	-	-	-
Other	8%	14%	13%	15%	8%	7%	10%	16%	42%	14%	-
n =	59	21*	127	27*	13*	15*	41	31	12*	14*	5*

LE GEOSPATIAL ...

- Composante riche :
 - S'exprime à l'aide de primitives simples :
 - Vecteur : points, lignes, polygones (et volumes en 3D)
 - Raster : données d'imagerie (pixel) mais aussi grid, point clouds
 - Complexe et potentiellement volumineuse
 - Lignes ou polygones avec dizaines de milliers de points
 - Détient une sémantique implicite
 - Forme, orientation, relations spatiales, ...
 - Nécessite des fonctions/opérateurs spéciaux pour l'analyser
- mais largement sous-estimée vs. le temps
 - Alors que fondamentale à la prise de décision pleinement éclairée !
 - Encore plus riche si on croise temps et espace (suivi spatio-temporel de phénomènes, mise en exergue de patrons qui se répètent dans le temps et l'espace, ...)

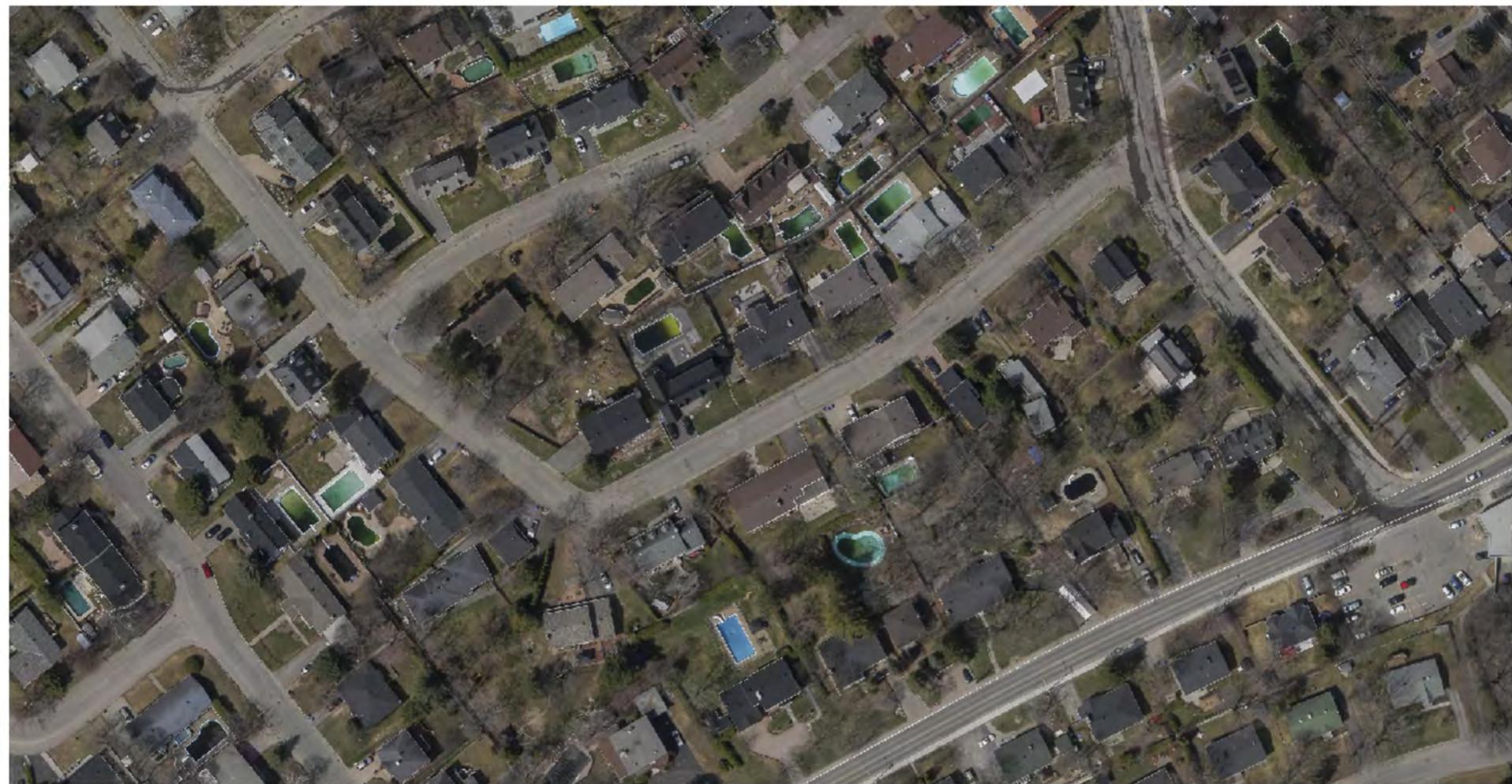


IMPACT ECO TRAIN DE BANLIEUE

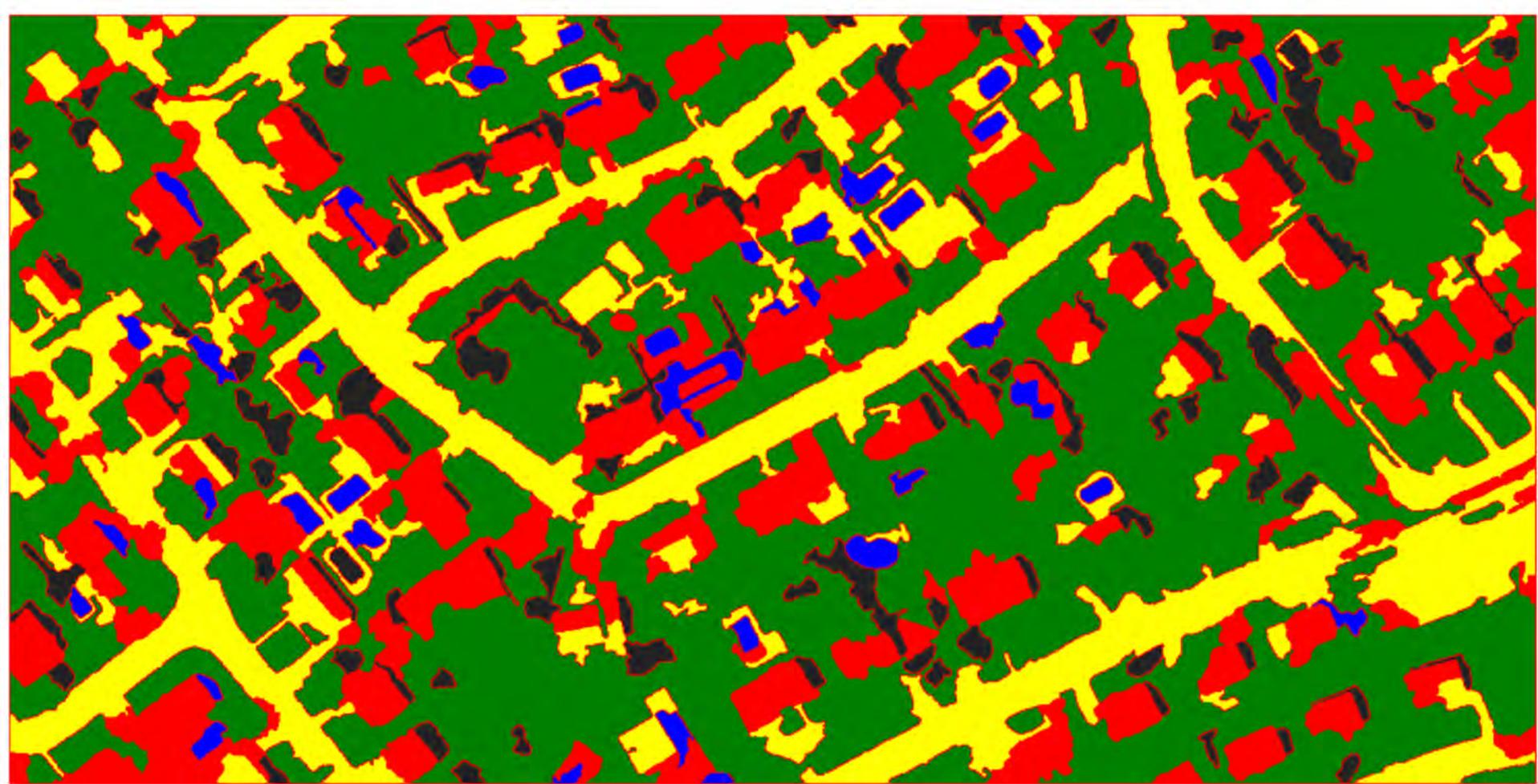


- ❖ Si les municipalités imposent une taxe de 1% sur le stock résidentiels (unifamiliales), les retombées estimées se chiffrent à 11M\$;
- ❖ Les coûts d'opération du service était de 7,5M\$ en 2009.

EXTRACTION DE BÂTIMENTS

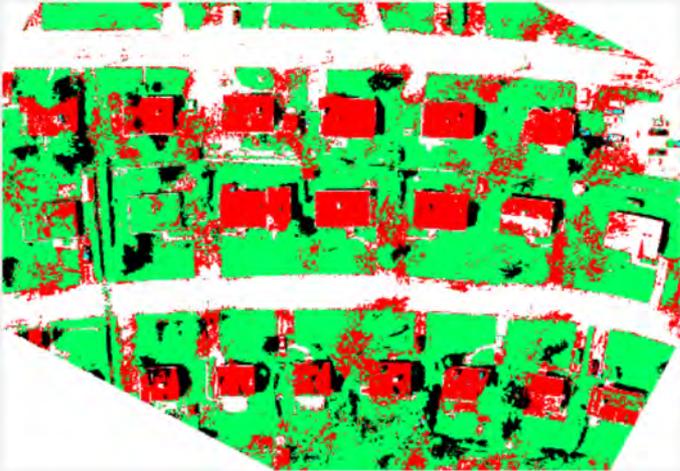


EXTRACTION DE BÂTIMENTS

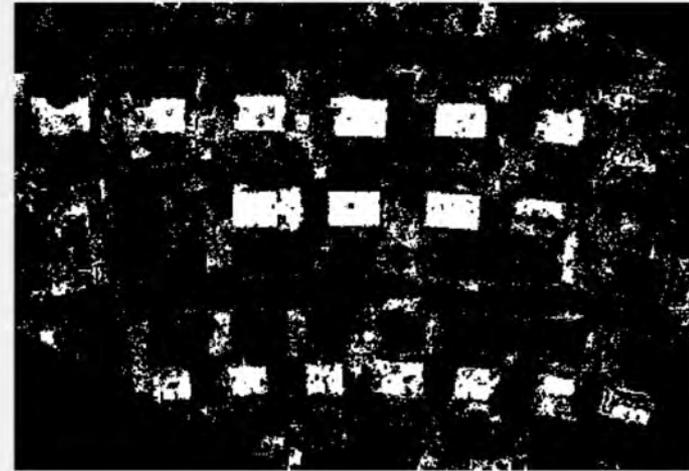


EXTRACTION DE BÂTIMENTS

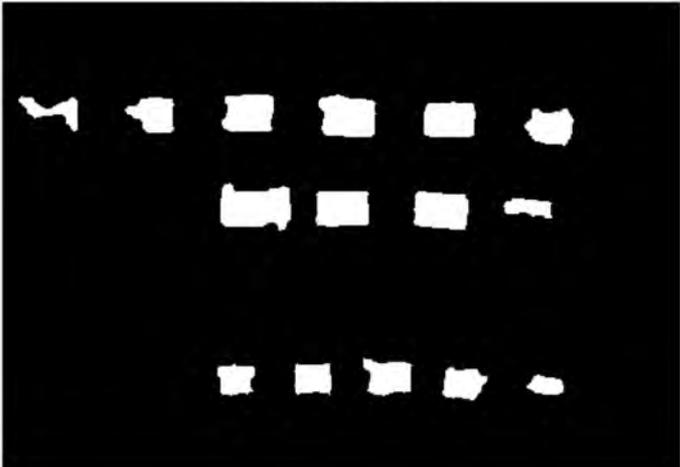
Image de base



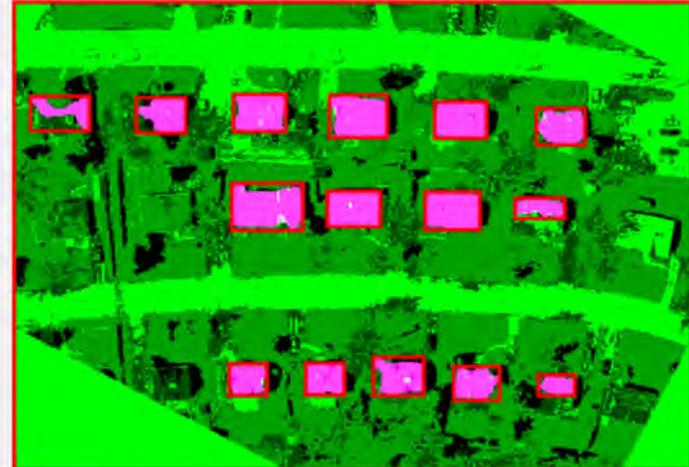
Extraction de la couche Rouge



Nettoyage du bruit



Bâtiments Détectés



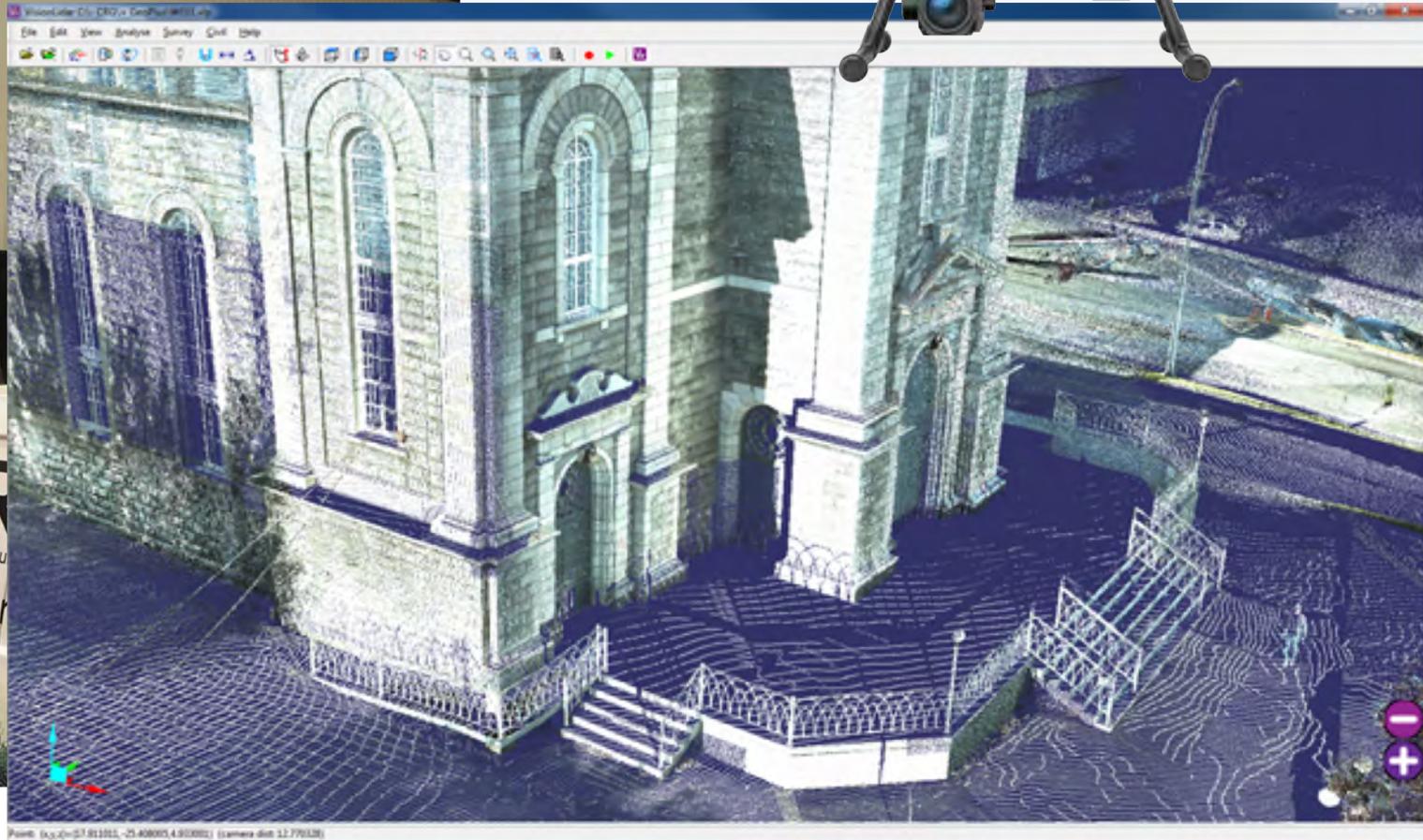
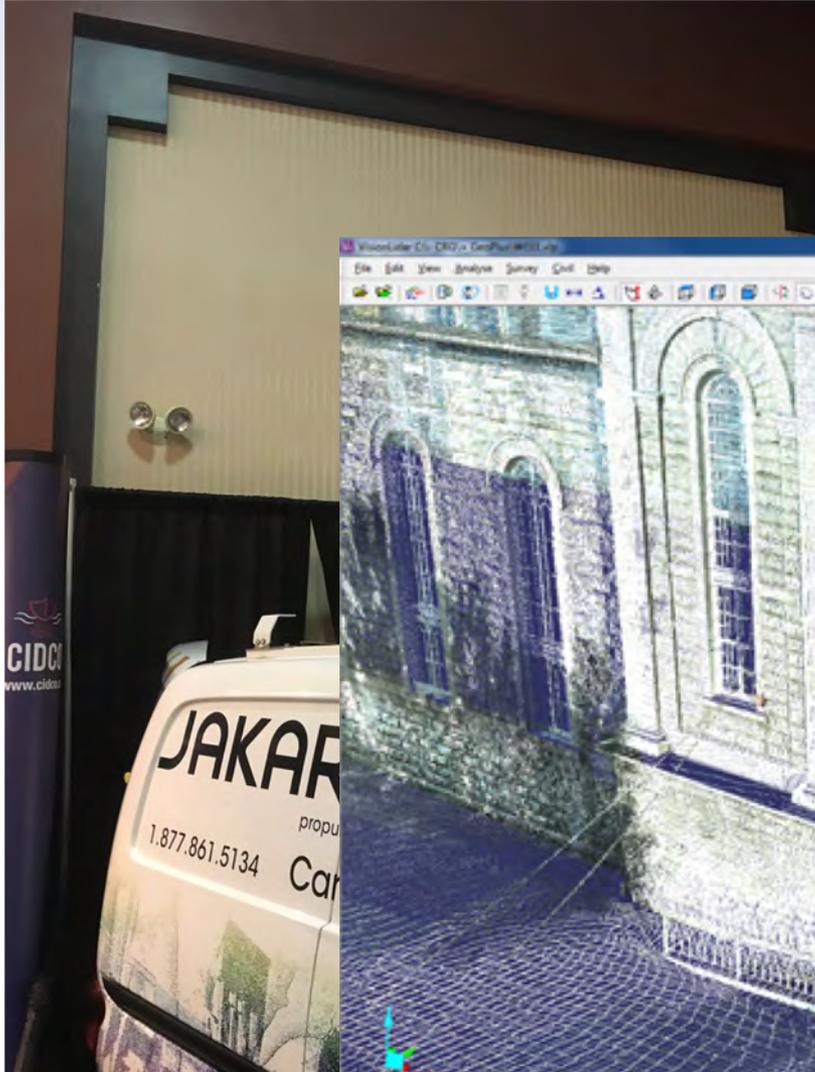
LIDAR TERRESTRE & DRONES



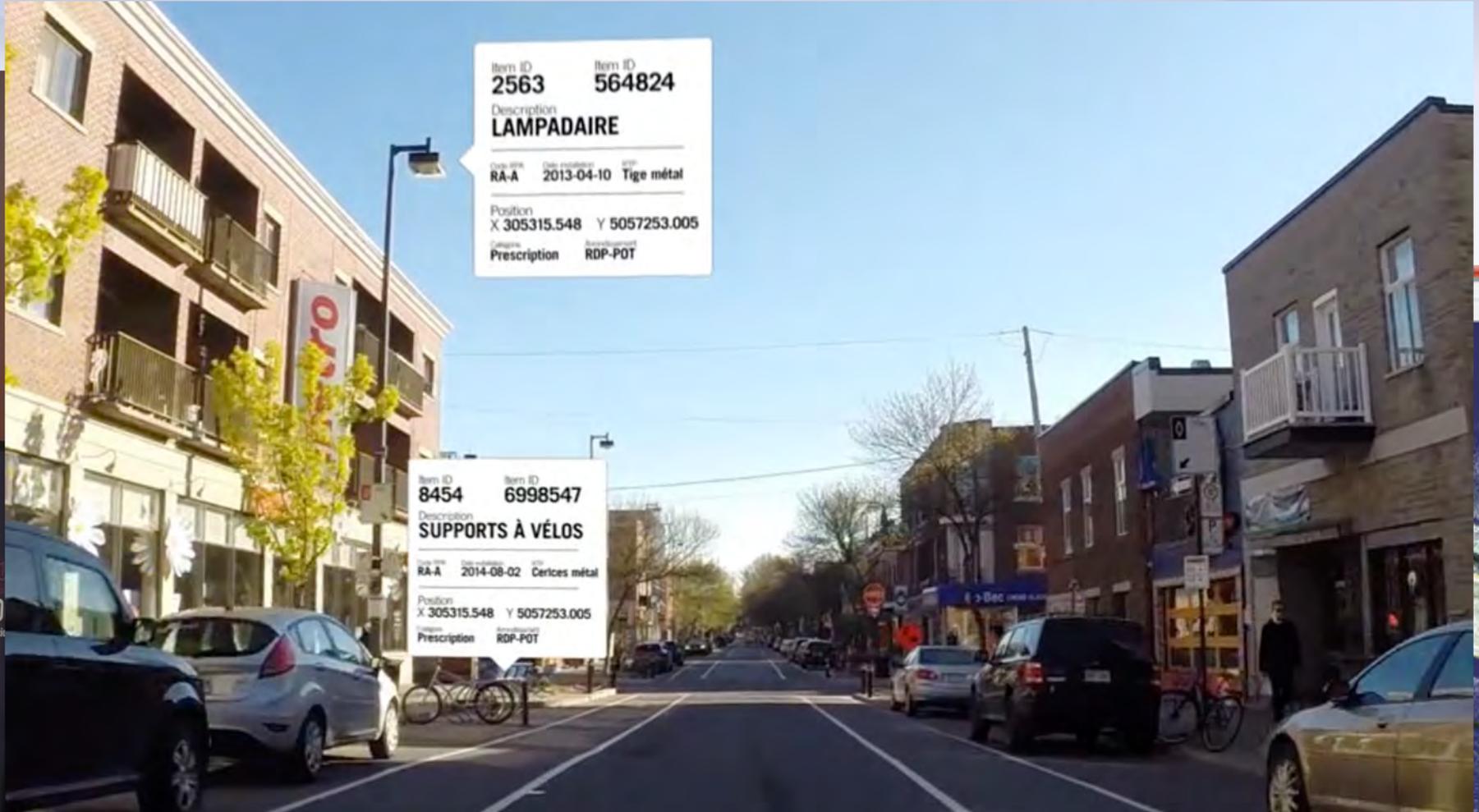
LIDAR TERRESTRE & DRONES



LIDAR TERRESTRE & DRONES



LIDAR TERRESTRE & DRONES

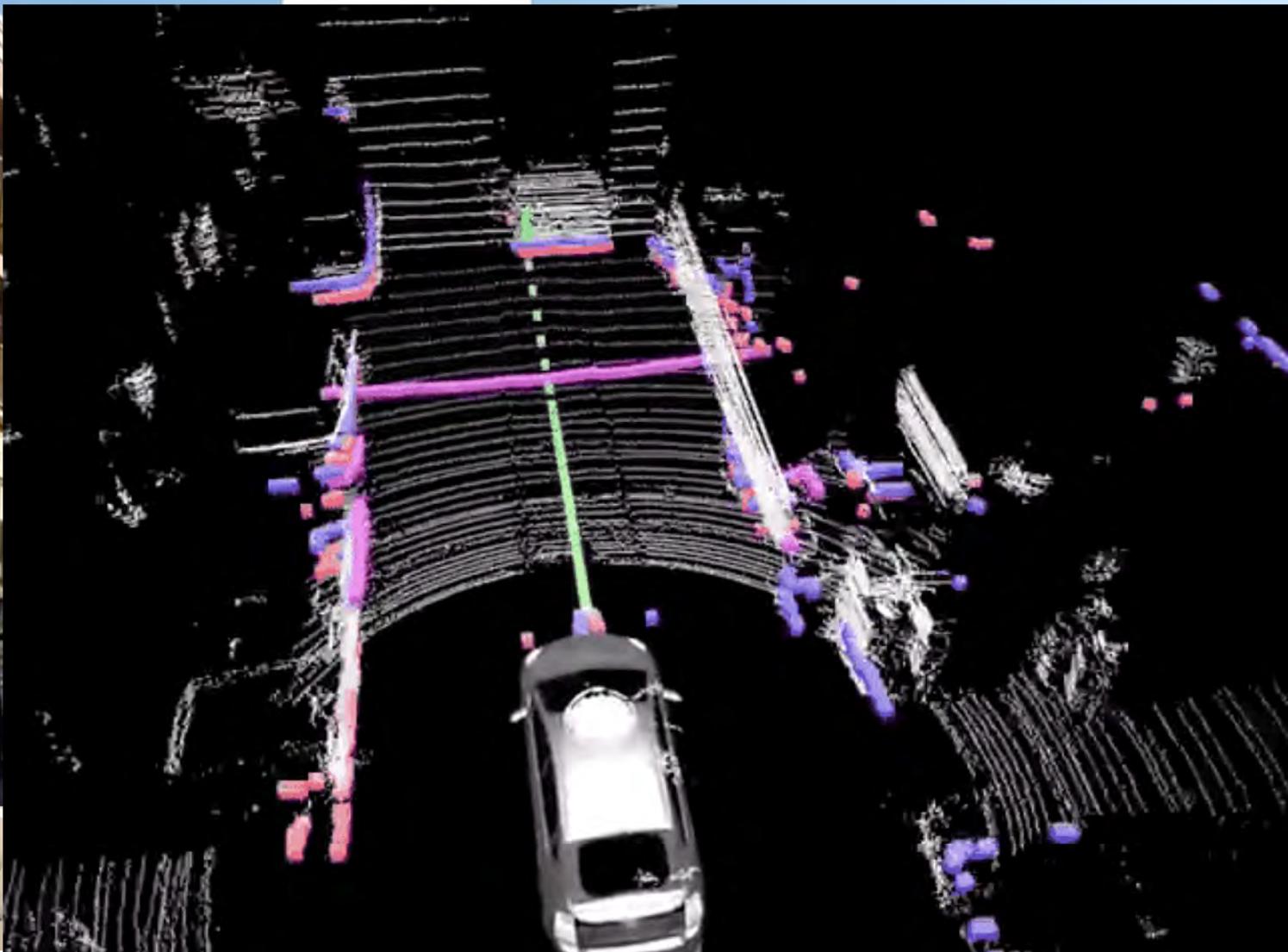


CID
www.cid

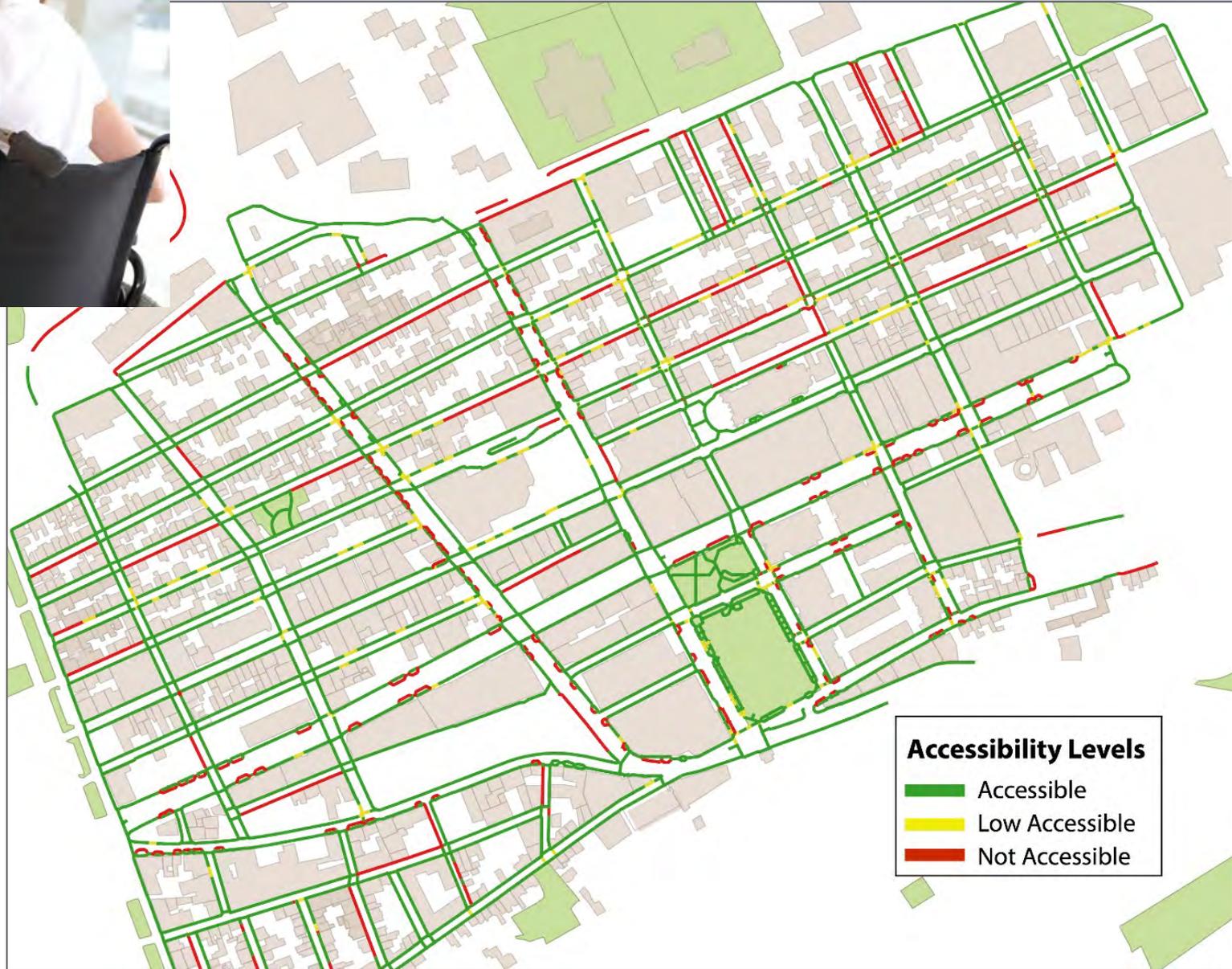


Point: (x,y,z)=(57.811011, -25.408005, 4.910002) (camera dist: 12.770126)

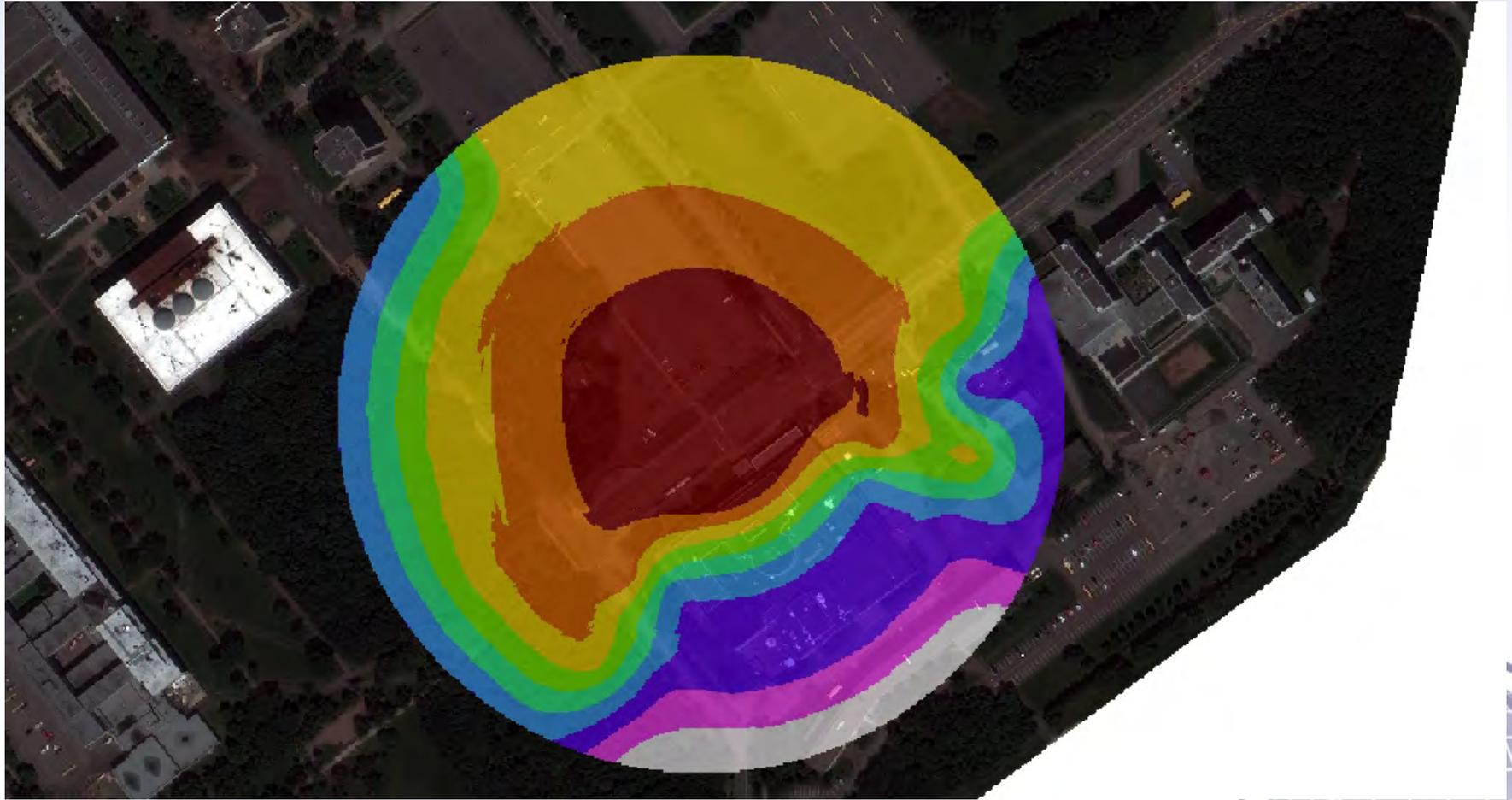
LIDAR TERRESTRE & DRONES



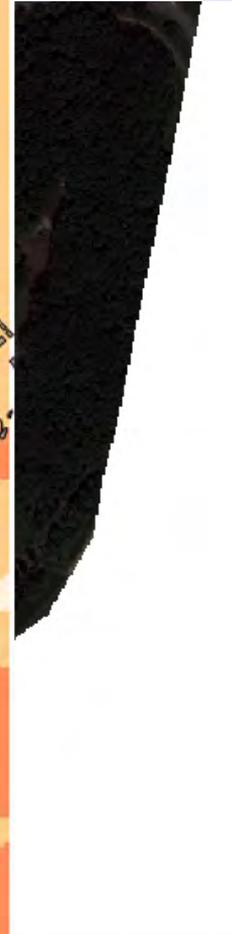
MOBILITÉ & HANDICAP



NIVEAU SONORE ET IMPACTS



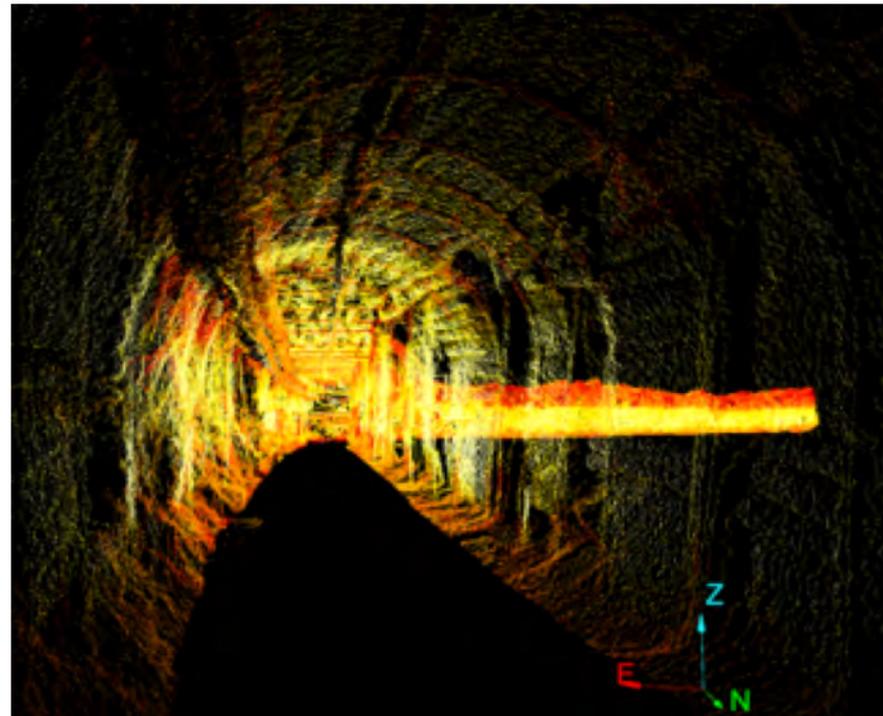
NIVEAU SONORE ET IMPACTS



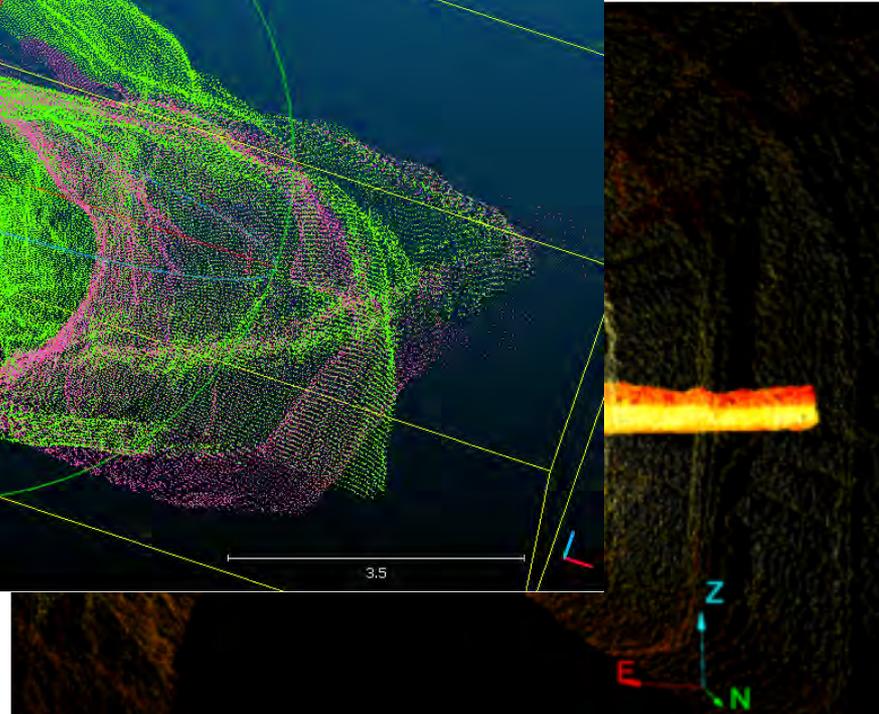
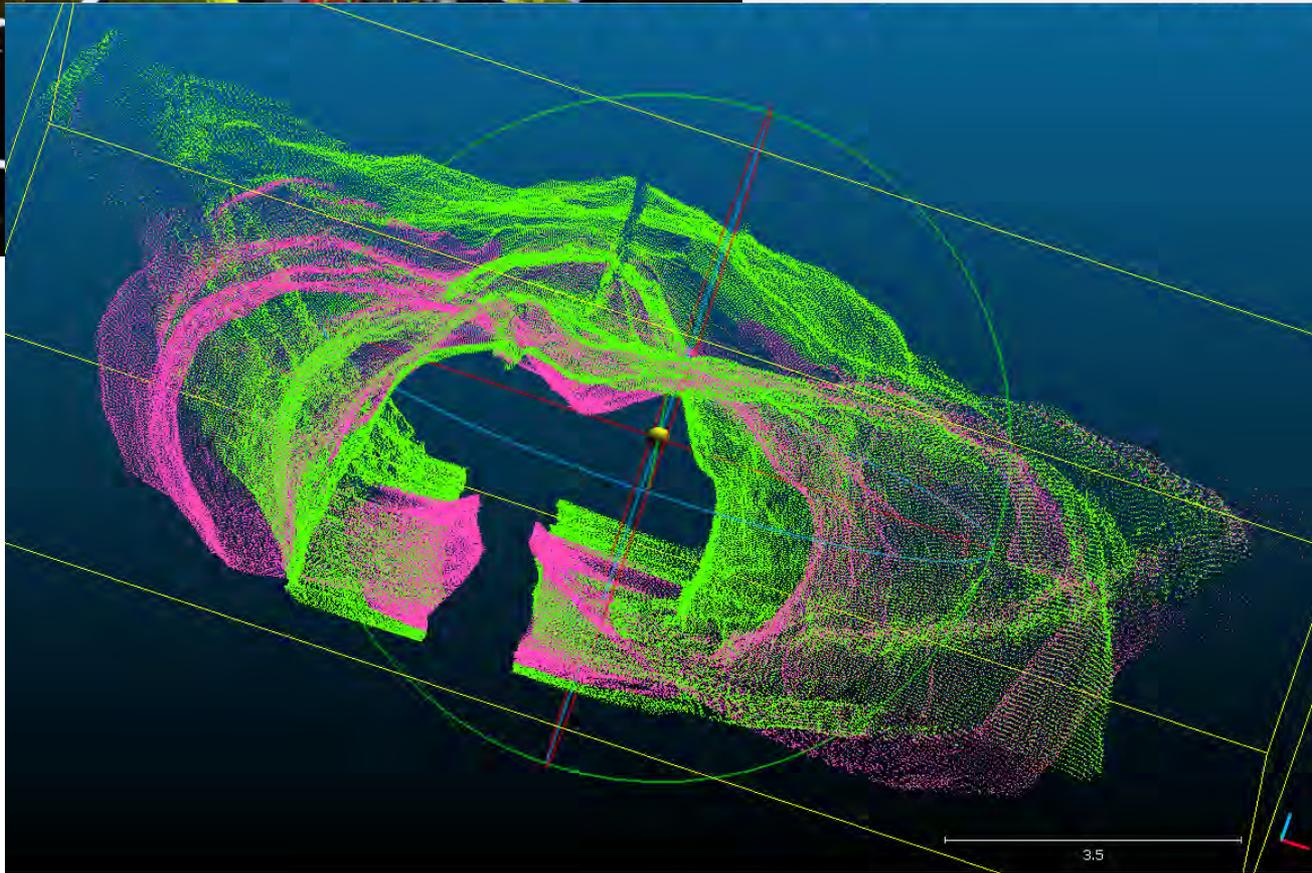
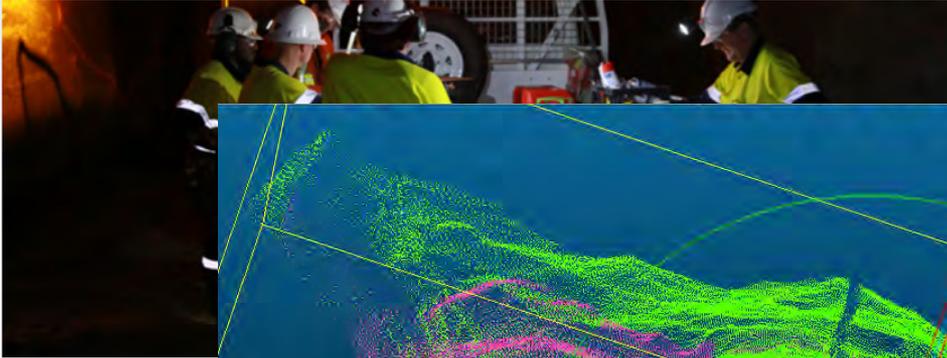
CONVERGENCE TUNNELS MINIERS



CONVERGENCE TUNNELS MINIER



CONVERGENCE TUNNELS MINIER



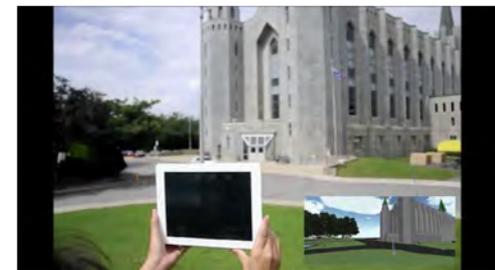


- Environnement virtuel du campus universitaire:

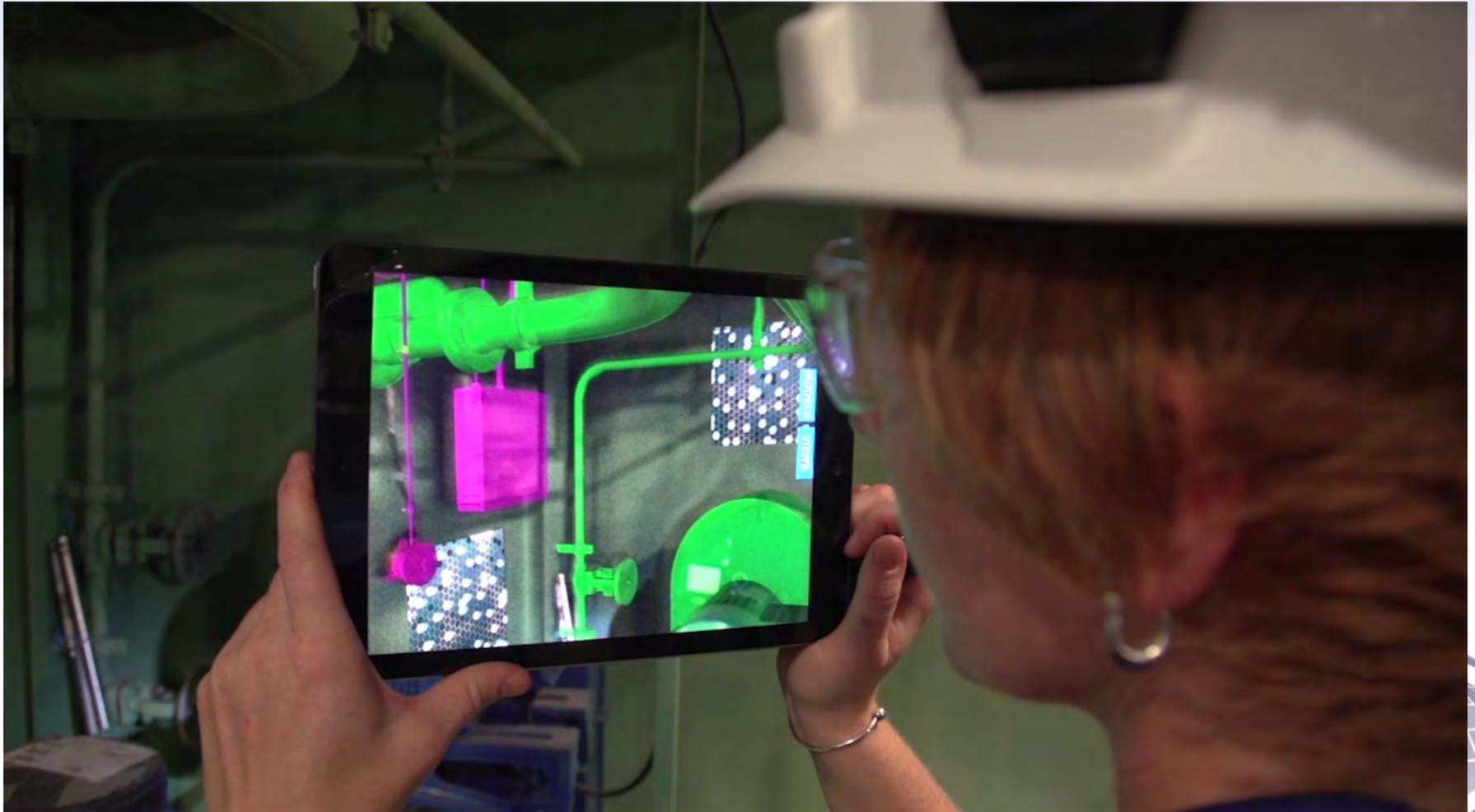
- Modèles MNT (Villes de Québec)
- Représentation 3D des bâtiments (relevés LiDAR terrestre mobile)
- Intégration dans le moteur de jeux Unity 3D

- Visualisation des tunnels et canalisations souterraines

- Projet qui a remporté le prix Coup de cœur aux Octas

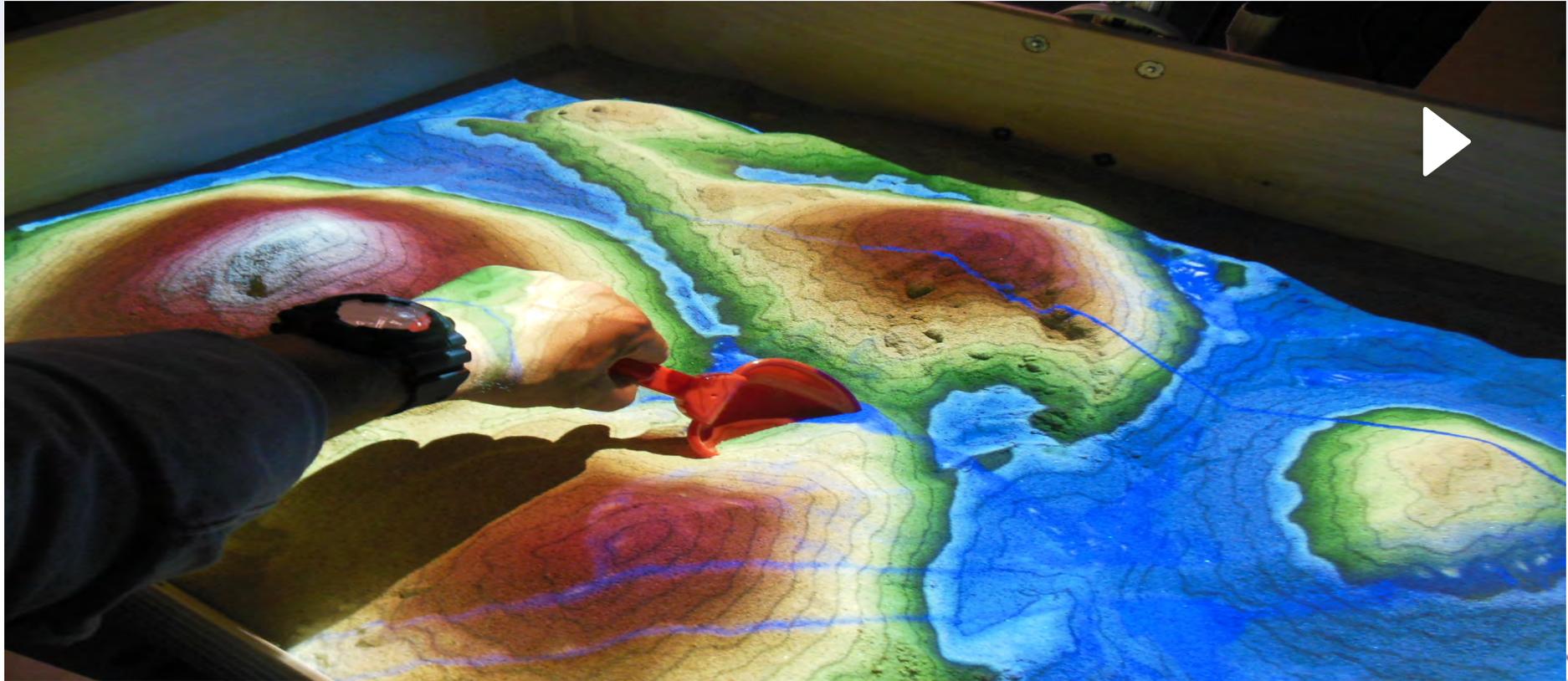


BIM ET REALITÉ AUGMENTÉE



Source: <http://www.machinedesign.com/cad/will-virtual-reality-replace-desktop>

EDUCATION



L'ÈRE DE LA SCIENCE DES DONNÉES

- Convergence Geospatial – Big data – IA
- Extraire l'info, la croiser, tomber les silos
- Mais aussi la découvrir automatiquement
- Le geospatial une dimension indispensable et pas hors de portée !
- Mieux comprendre les comportements et phénomènes du monde réel et les prédire !
- Et dégager des avantages compétitifs \$\$\$



VIE PRIVÉE ET ÉTHIQUE

- Mais enjeux de gouvernance, d'éthique et de responsabilité !
- Justice spatiale
- Importance d'une déclaration comme celle sur l'IA responsable
- Le géospatial, une des composantes intrinsèque de l'information et hautement stratégique \$\$\$



CRG - LES MEMBRES

Le CRG regroupe actuellement :

- 17 chercheurs réguliers
- 6 chercheurs associés
- 10 professionnels de recherche
- Plus de 50 étudiants de deuxième et troisième cycles
- Plusieurs stagiaires





Le CRG devient le CRDIG ...

Centre de Recherche en Données et Intelligence Géospatiales

Prochain séminaire - Quand la musique
rencontre la géomatique !

07/10/2015

Vous êtes cordialement invité à assister au
prochain séminaire du CRG, **mardi le 13 octobre,**
de 12h à 13h.

[Lire la suite](#) —

Le titre de professeur émérite pour Marius
Thériault

01/10/2015

L'Université Laval a récemment honoré 10
professeurs pour leur remarquable contribution à
l'enseignement et à la recherche. Parmi ces
professeurs, Marius Thériault ...

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A LA RECHERCHE D'UN PROJET
DE M.SC. OU DE PH.D.

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actuellement offertes par nos chercheurs !



www.crg.ulaval.ca

Nous contacter

info@crg.ulaval.ca

www.crg.ulaval.ca

Thierry Badard (Directeur)

thierry.badard@scg.ulaval.ca

