

Implementing ArcGis 10 infrastructure to resolve mining problems

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INTRODUCTION

The El Teniente copper Mine is located in central Chile, Lat 34° 08S, Long 70° 35W, about 2000 m.s.l, it's a mixed operation with an underground mine (85% of the production) and a Open Pit Mine (15% of the production), with an actual production rate of 141 ktpd but growing to 167 ktpd in the next few years, exploiting total proven reserves of 2300 MTon of 0,86% average Cu grade for the next 50 years.

The issues dealt in this paper is to highlight the usefulness of GIS technologies in the ArcGis 10 platform to analyze and solve different problems related to mine services, geocoding and land planning of the mining activities. We also discuss some learning's and challenges of the GIS Governance experience from the launching of the platform late 2011.

ISSUES

- ArcGis GPS using a Trimble Pro XRT for tracking a new temporary access for the South Open Pit
 - Interoperability of SAP-GIS data infrastructure for maintenance of the main water supply piping (1200 l/s) of the company.
 - Use of INSAR (Interferometric synthetic aperture radar) data to model vertical and horizontal movements in the vicinity of the actual mine cave area.
 - Geocoding and localization of mine workers
 - ArcGis modeling for urban planning in coordination with local authorities
 - Governance of GIS Administration
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GPS DEVICE APPLICATION: TRACKING A PATH FOR MINING TRUCKS AND HEAVY MACHINERY



➤ ArcGis GPS using a Trimble Pro XRT for tracking a new temporary access for the South Open Pit

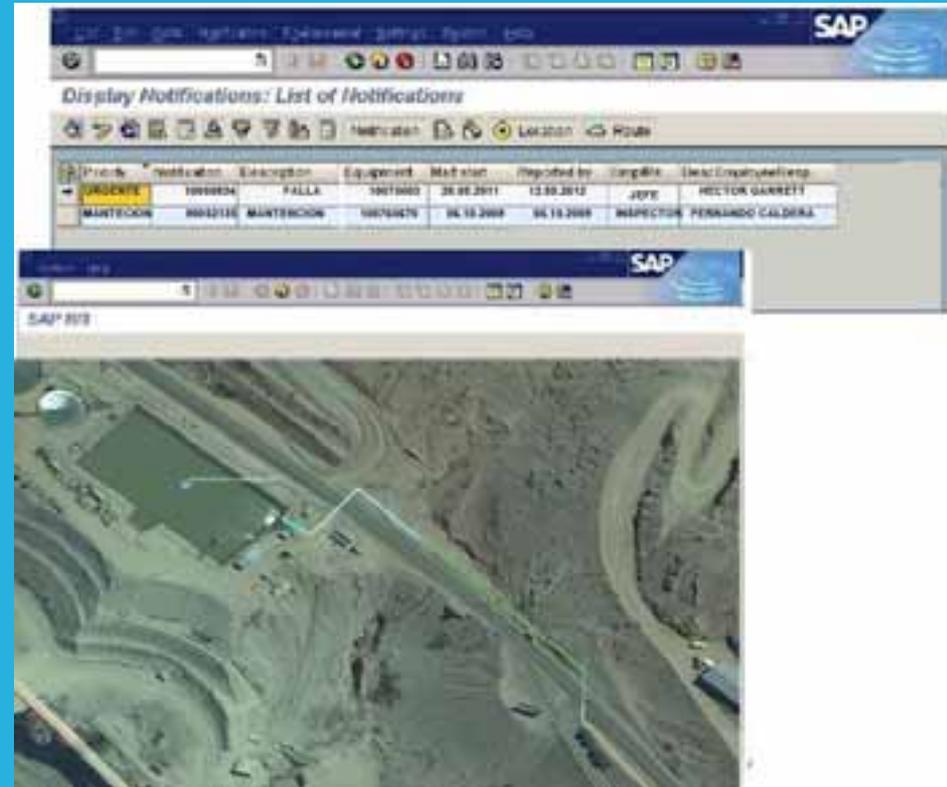


CONCEPT:

By tracking the route mapped inside a moving vehicle and plotted over the Bing Map Image of the ArcGis Server, helps the engineers of the project to better plan the construction design and heavy equipment used in doing the road.



INTEROPERABILITY OF SAP-GIS DATA INFRASTRUCTURE FOR MAINTENANCE OF THE MAIN WATER SUPPLY PIPING



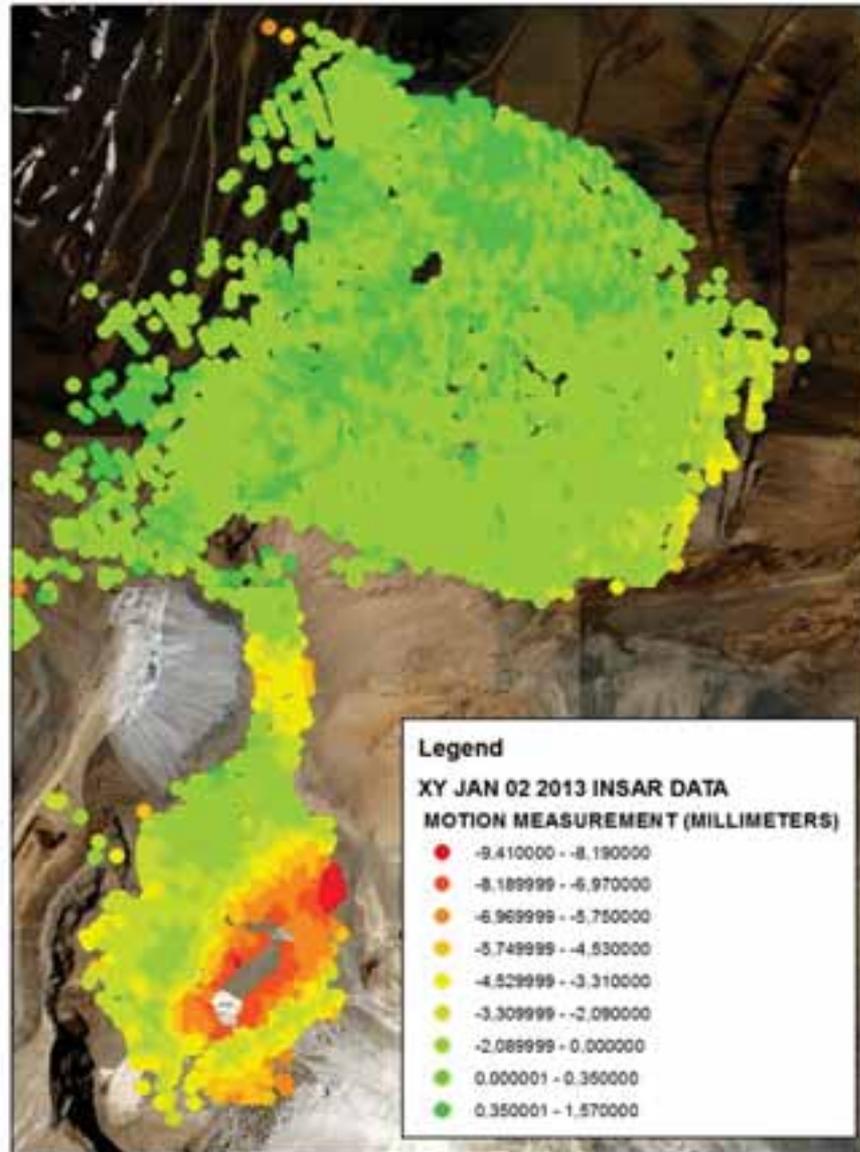
CONCEPT:

By implementing this solution of interoperability of the SAP PM Maintenance module and GIS platform of the main water supply piping, it opens the possibility to involve other areas that uses SAP in spatial related infrastructure as: electricity supply, road maintenance, logistical operations among others.

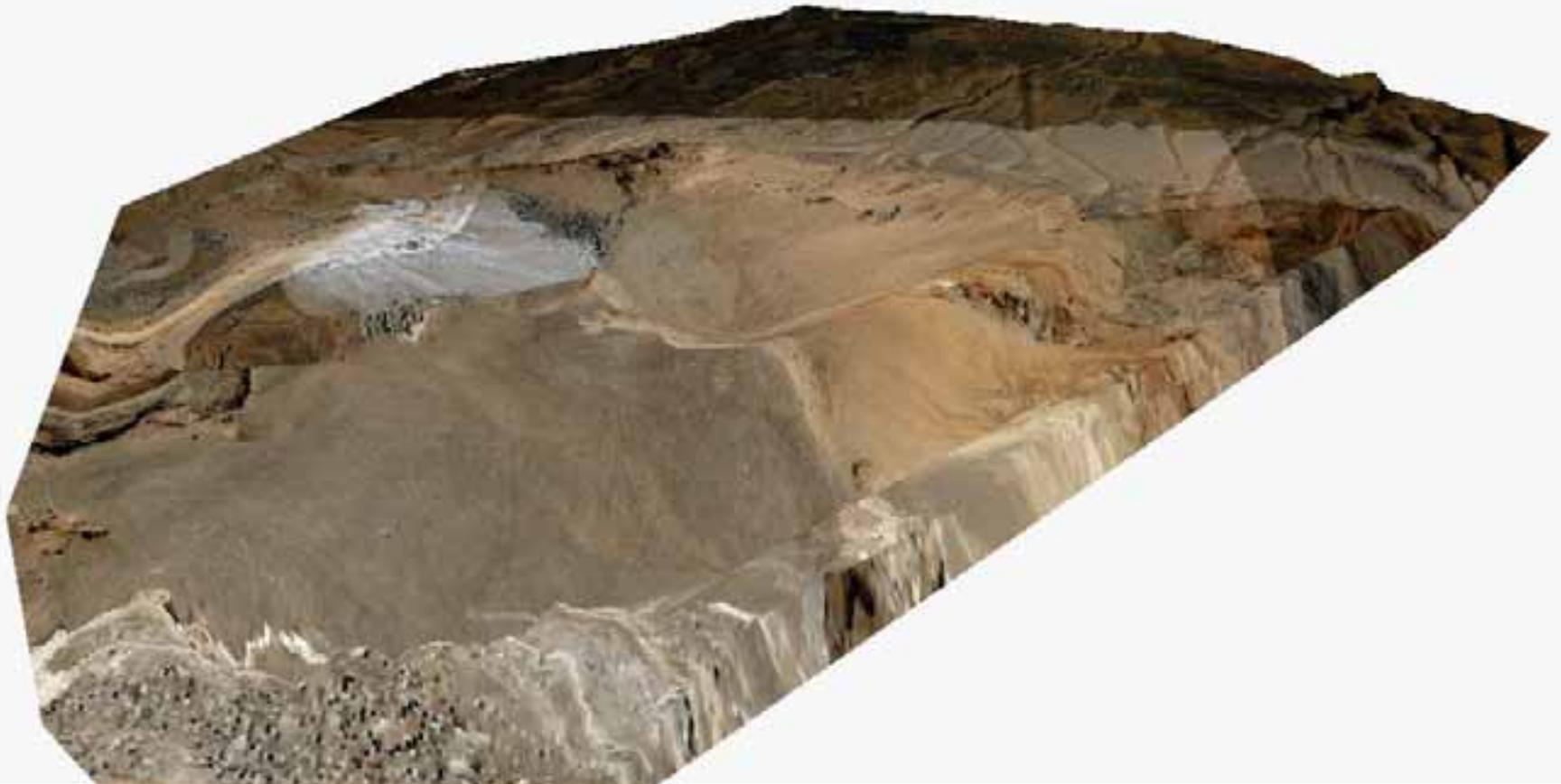


**USING DATA FROM INSAR
RADAR**

Use of INSAR (Interferometric synthetic aperture radar) data to model vertical and horizontal movements in the vicinity of the actual mine cave area

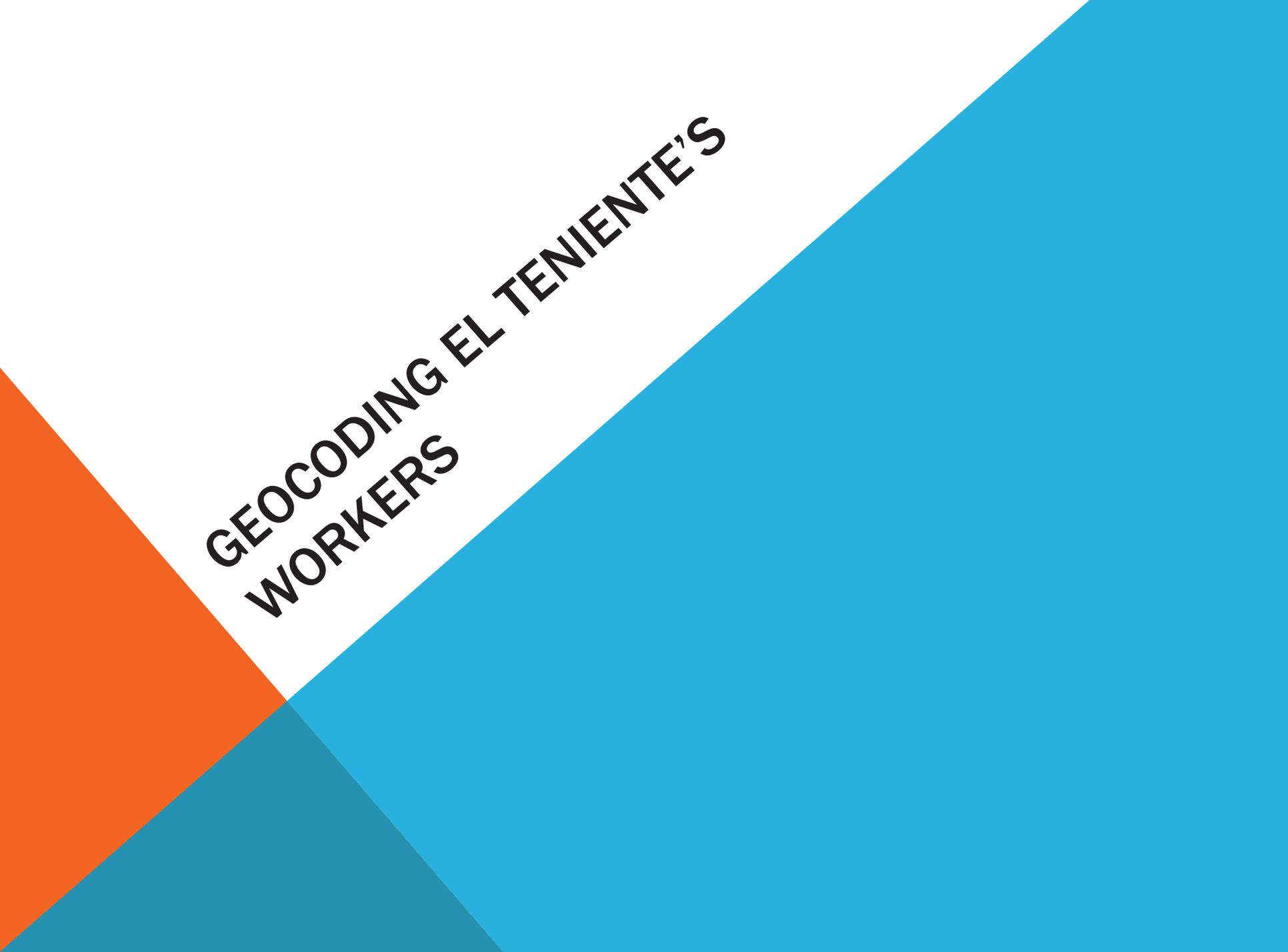


3-D ArcGis scene video showing the motion movement interpolation over imposed to a LIDAR Image of the area surrounding the mine crater area



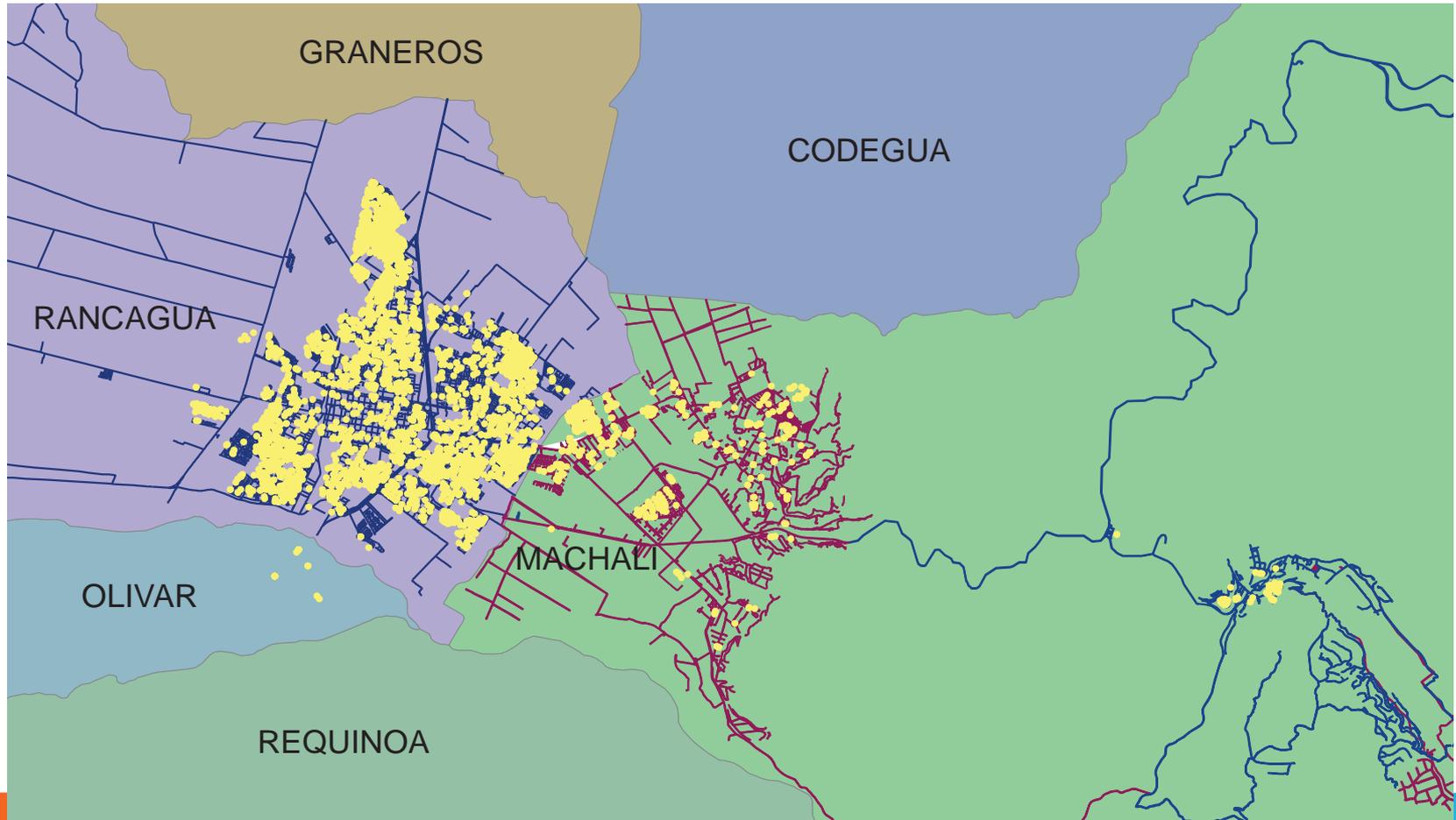
CONCEPT:

By using INSAR data within the ArcGis platform to model vertical and horizontal movements in the vicinity of the actual mine cave area, permits the engineers to visualize and interpret patterns of movements in order to alert the users of the territory monitored.



**GEOCODING EL TENIENTE'S
WORKERS**

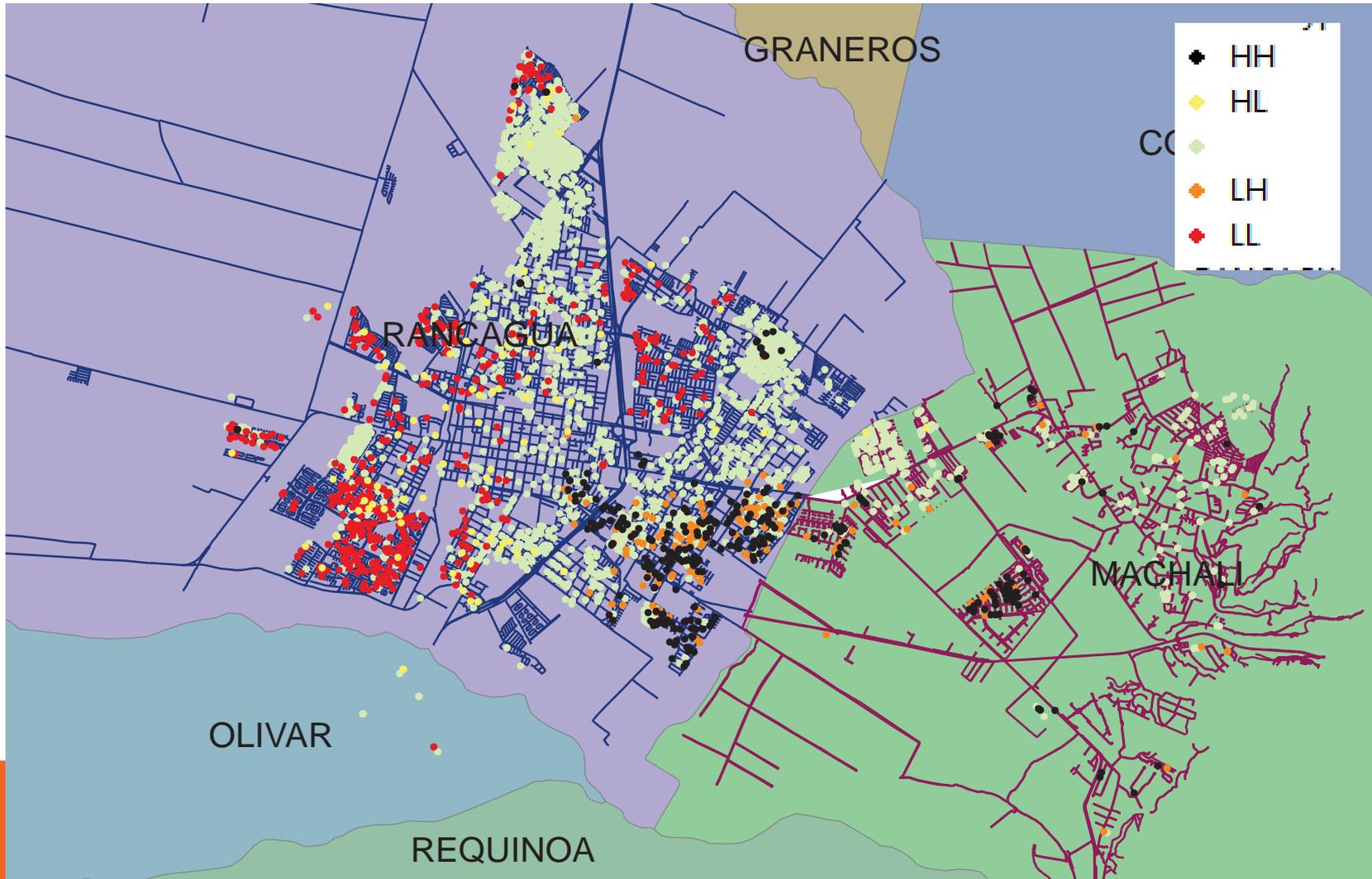
Using Geocode address in Arc toolbox to georeference the Teniente workers home address



TOTAL OWN WORK FORCE: 4971

TOTAL TWORKERS GEOREFERENCED: 4413 (88,8%)

CLUSTERING OF THE WORKERS BY THE INCOME *



* H: High values of income
L: Low values of income

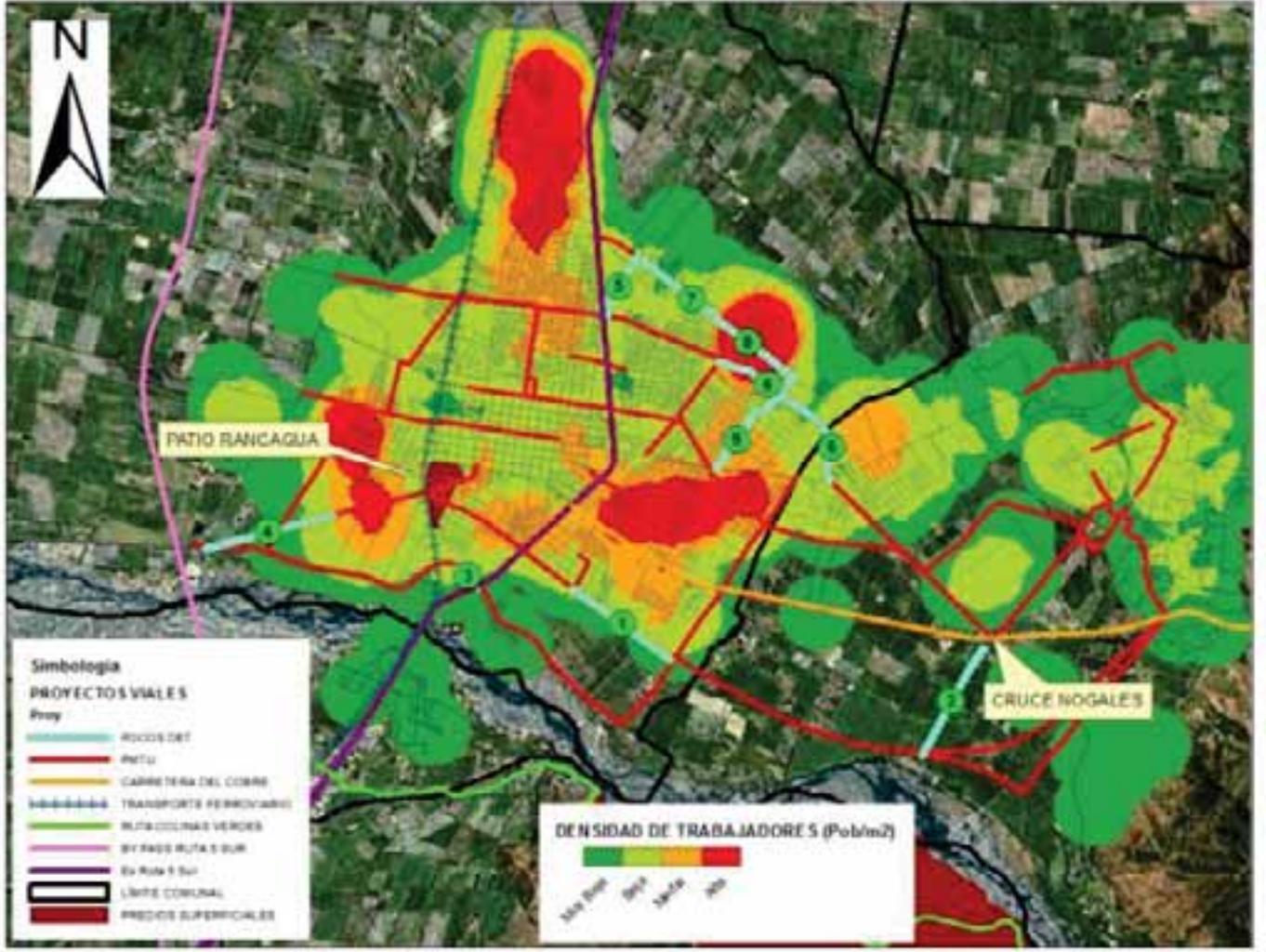
CONCEPT:

By using Geocode address in Arc toolbox to georeference the Teniente workers home address we found problems with incomplete data base for street, neighborhood names), using the official workers database (Departments, professions, salaries, N | of children, sex, cargo etc) permits better planification and internal control of our workforce.

URBAN AND REGIONAL PLANNING



BETTER TRAFFIC SOLUTIONS FOR PERSONNEL TRANSPORT BETWEEN RANCAGUA AND MACHALI CITIES



CONCEPT:

By using Spatial analyst extension in Arc toolbox allows to relate the workforce density with the own bus transport network in order to improve the transport planning This information impacts on local government transport policies and therefore a contribution of the company to diminish traffic jam.

Strategic spatial data analyses permits us a proactive proposal to establish an official planning instrument with local municipal authorities of actual and future mining related activities. Since 100 years of exploitation this area is treated nowadays as an factual "Industry Area", so we've had problems and delays in approving land change authorizations from local authorities.

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GIS GOVERNANCE EXPERIENCES



ADVANTAGES USING AN ENTERPRISE GIS SOLUTION

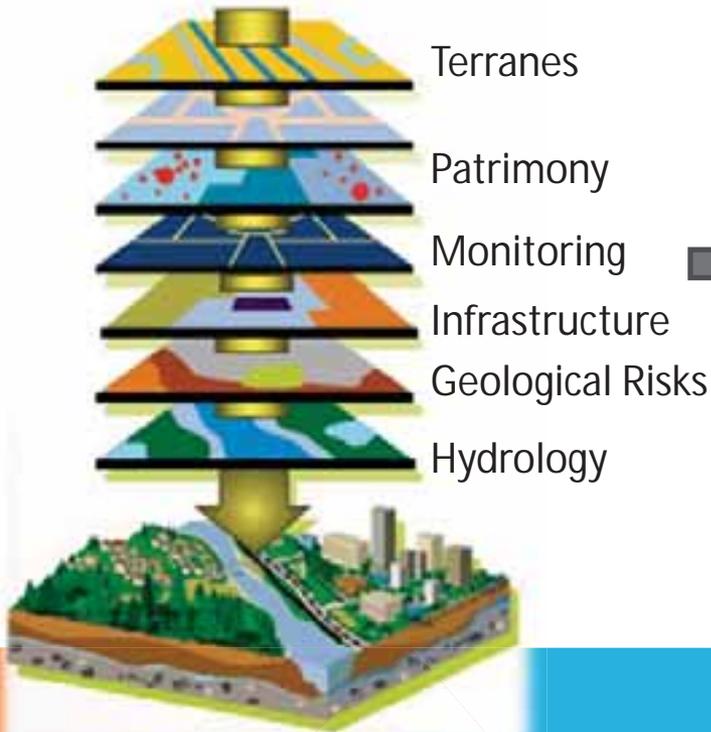
- Sustain the projects with spatial data management and better project control
- Better strategic territorial management of the company's interests
- Better SAP-GIS platform integration workflow between different areas (Water, energy, Transport etc.). Also GPS data, Environmental monitoring, INSAR data etc.
- Robust integration of GIS best practices in the GIS Administration inside the mining industry and other business and state offices.
- Incremental knowledge management and diminishing time effort in data and information search for the projects

SOME CHALLENGES:

- Increase the systematic engagement of collaborating areas
- Increment the involvement and competences of basic users and representatives of the areas
- Increase interoperability with other areas handling GPS data, monitoring data, maintenance data etc.
- Diversify GIS applications and apps to different problems within the mining supply chain.

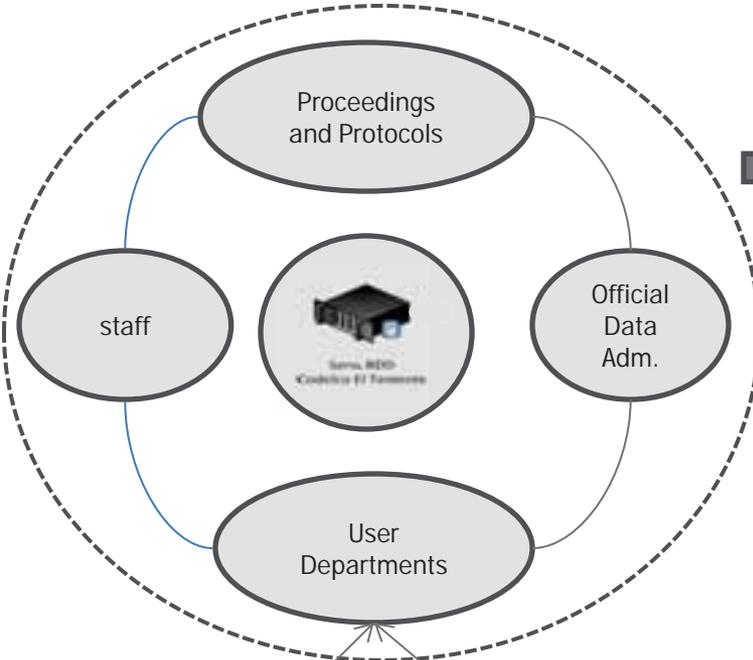
EL TENIENTE GIS STRUCTURE AND MODELL

Conceptual layout



Institutionality and Operation Modell Of Teniente GIS

Administration Function
(Components)



webmapping



Decision takers
(1st & 2nd line)



Basic Users

GIS Responsible
In Departments



Department users



EL TENIENTE CORPORATIVE GIS MODELL

