Project Title:

Safer Roads in Ethiopia through Identification of High-risk Locations

Deliverable

Report documenting the Final release of Road Crash Analytical Map

Milestone number	4
Deliverable	1
Innovator	InnoConnect s.r.o. (INNO)
Date	20.10.2023

I.   INTRODUCTION

This deliverable is submitted within the *'Safer Roads in Ethiopia through Identification of High-risk Locations'* project delivered by InnoConnect s.r.o. (short name: INNO) within the United Nations Development Programme under the joint project of the Czech-UNDP Partnership for Sustainable Development Goals.

The deliverable is a part of the project's Activity 7. *Final release of traffic incidents analytical map – implementation of the user´s feedback*. The goal of the deliverable is to document the release of the software prototype, developed according to the user requirements (Activity 3), integrating data provided from the Activity 4 Data Analysis, building on the Prototype releases done in Activity 5, and capturing user feedback provided during user testing (Activity 6).

The annex of this deliverable provides the Executive Summary of the project in the local language in Ethiopia, Amharic.

This deliverable is submitted within the Milestone 4 report in October 2023.

II.   FINAL RELEASE OF THE ROAD CRASH ANALYTICAL MAP

As documented withing the previous Milestone 3 (in Deliverable 2) in June 2023, InnoConnect released two versions of the Traffic Incidents Analytical Map, the Alpha release in March 2023 and Prototype release in May 2023. These releases were tested by the end users who delivered feedback at multiple occasions.

The Activity 6. User Testing and Feedback was originally scheduled up to June 2023 only. However the user testing was still ongoing during the summer 2023, therefore InnoConnect recommended to continue the user testing up to August 2023, to allow more user feedback to be captured.

A user testing workshop (online) was organised on 19 June. Additional user testing continued via an online survey. Positive evaluations delivered were accompanied by a suggestion to develop a functionality that will allow to switch and explore the data in the Ethiopian calendar, next to the currently implemented Gregorian calendar. This functionality was implemented in the final release of the Road Crash Analytical Map.

The engagement of more road safety experts in the user testing resulted in a recommendation to use the term of 'Road Crash' rather than the original term 'Traffic Accidents'. InnoConnect therefore started to systematically use the new name of the main project result, i.e. the Road Crash Analytical Map of Addis Ababa. This term is now also used in the title of this deliverable.

A. ADDITIONAL DATA ANALYSIS AND PROCESSING

During the period of June-September 2023, multiple additional data sources were further provided by the local partners, also thanks to the engagement of the traffic safety experts from Bloomberg Philanthropies Initiative for Global Road Safety who council Addis Ababa on traffic safety.

Overall, the databases provided information on 5.500 road crashes.

The databases provided included additional fatal road crashes data, some with more precise coordinates of the single crashes. One database includes several thousands of road crashes that resulted in light or severe injuries. The quality and scope of the provided databases varies significantly. The main issues detected in the data included the following

- Attributes provided in one database are not provided in the other, making it difficult to compare the data and use it in a single visualisation. This was resolved by data processing done by InnoConnect, where possible.
- Sometimes unique IDs of crashes are missing which makes it difficult to link the crashes across multiple datasets; when possible, InnoConnect's data analysts linked the crashes based on the other attributes
- Coordinates are missing for some crashes
- Issue with projection of coordinates; sometimes crashes are located 'out of the main roads' where they in fact happen. This was partly solved by InnoConnect who develop a new database function that locates the crash to the closest road.

More specifically the data processing done by InnoConnect identified the following issues and resulted in the following:

- All data files merged in single DB (column DB source added)
- Crash type was provided for almost all crashes
- 20% crashes are missing geometry
- Coordinates checked in google earth vs. Glayer with no difference detected
- Coordinates corrections manually: swapped coordinates, correction of wrongly placed or missing decimal point, meaningless coordinates removed
- Typos in crash data - corrected
- Often duplicate terms (e.g. Day sunrise and sunrise) were merged
- Injury severity - only provided for some crashes in Injuries
- Road condition usually not provided (only about 700)
- Intersection type: multiple terms for the same situation (X / x cross / cross junction) - merged in X
- Road surface type - asphalt subtype appeared once -> reduced under asphalt
- Geometry and slope - mixed in single attribute, should be separate (what if uphill and straight?)

- Road Divider and Direction
    - mixed in single attribute (what if 2-way-street and divided by island?)
    - e.g. Divided by solid line written in 3 ways
- Fatal crashes: Pedestrian movement only included in partly 2013 and 2014
- Fatal crashes in 2013 - missing data in last 3 months
- Few crashes with no / meaningless date were removed
- Collision type merged in four terms (e.g rear-end / head-end collision)
- Missing timestamp caused problems in time charts (they appeared on 1.1.1970 at 00:00). A workaround technical solution was developed at the level of the front-end application

B. FINAL RELEASE OF THE ROAD CRASH ANALYTICAL MAP

Given the heterogeneity of the data, two versions of the tool were released:

The version with cleaned fatal road crash data for 2020-2022:

https://glayer.innoconnect.net/ethiopia_crashes_s2

The version with cleaned road crash data that also includes injuries in the period 2018-2022:

https://glayer.innoconnect.net/ethiopia-crashes-s1

- Note: the purpose of this version is to bring attention to the gaps in the data that are possible to analyze via the charts in the right panel, e.g.
    - missing timestamp for most of the crashes
    - missing geometry, and
    - gaps in the recording of other attributes such injury severity, collision type, light conditions, weather, road condition, intersection type, road divider and direction, road geometry and slope, pedestrian movement).

The final release was presented to the end-users, the road safety experts of Addis Ababa, during the workshop on 30 August 2023 held in Addis Ababa. The tool equips decision makers with data-driven insights for effective measures to reduce fatal and severe road crashes. Key stakeholders, including the Traffic Management Agency of Addis Ababa, traffic police, G&Y Engineering Consult, and the Bloomberg Initiative for Global Road Safety, engaged in discussions about data collection, interpretation, and road safety policies.
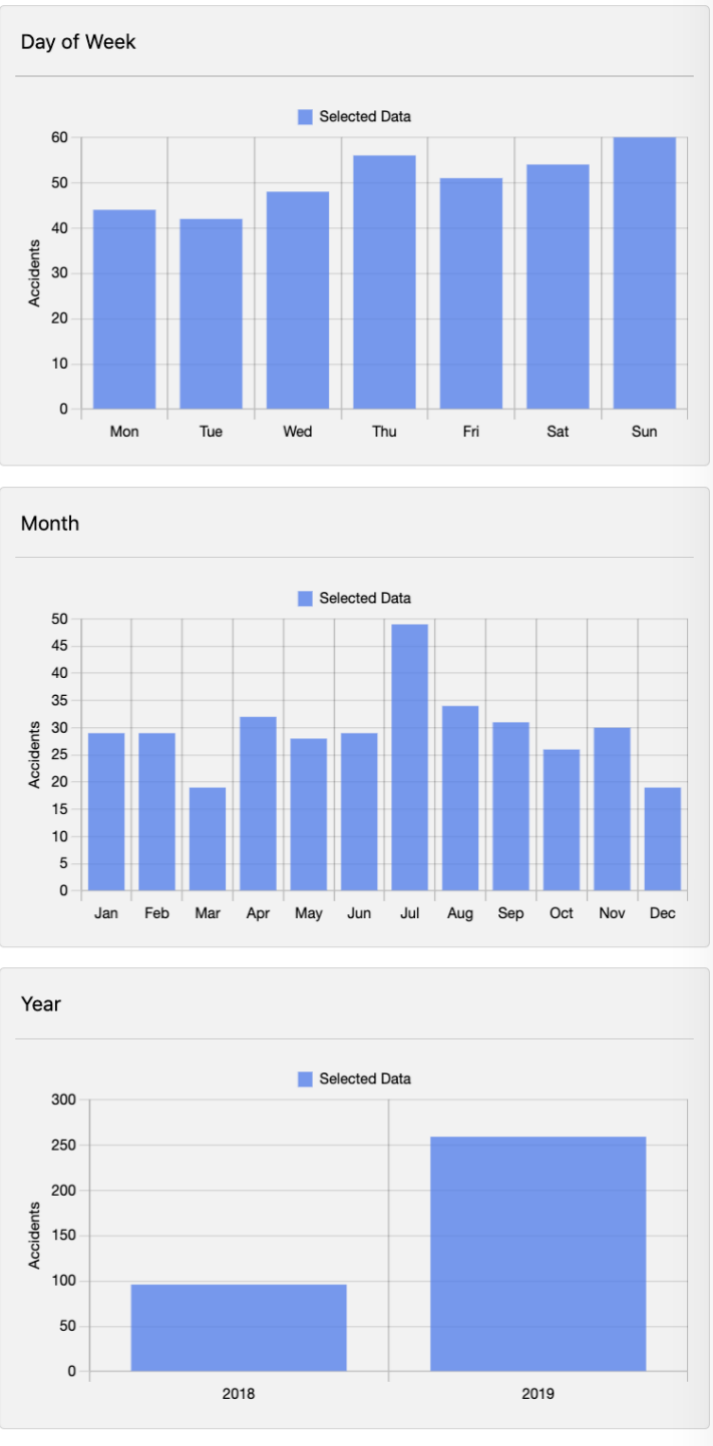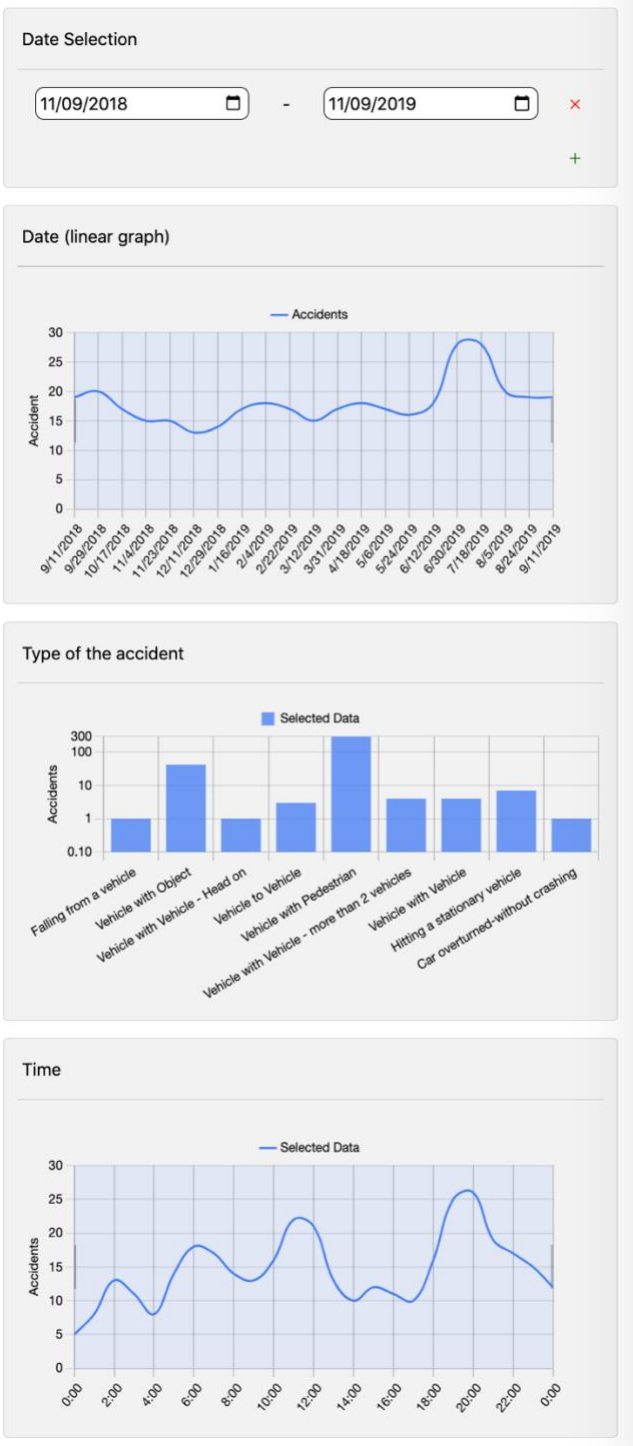
C. SCREENSHOTS

The figures below document the main functionalities of the web application:
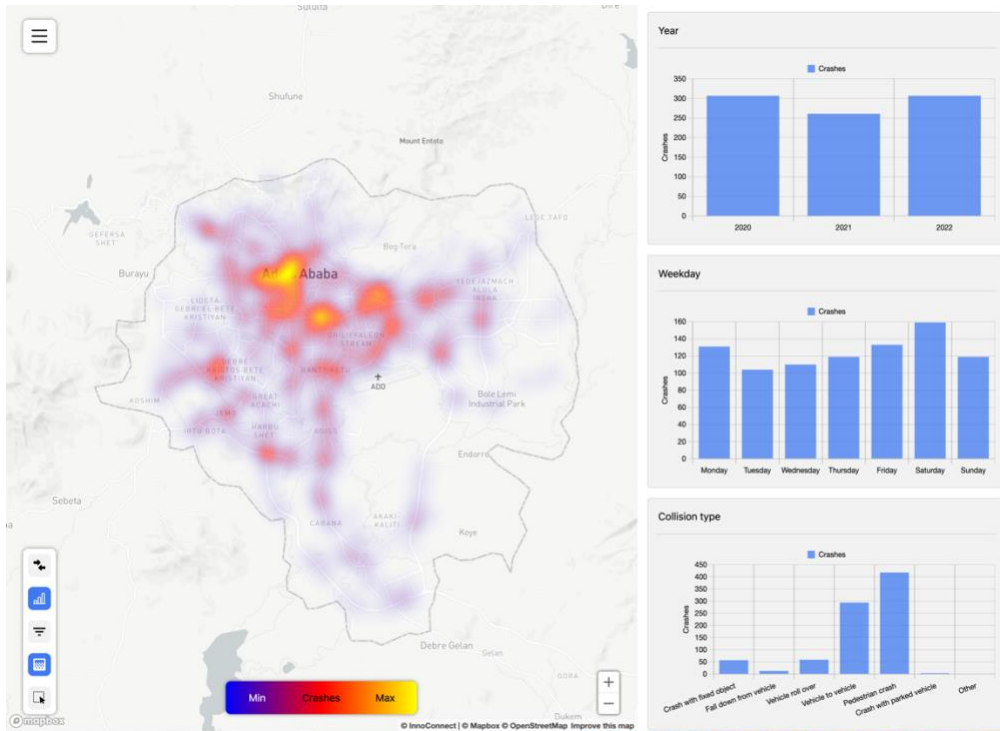
*Default screen of the Road Crash Analytical Map with interactive charts in the right panel*

*Dark mode of the application (can be activated in the left menu)*

Date Selection

11/09/2018 — 11/09/2019 × +

Date (linear graph)

— Accidents

Accident

30, 25, 20, 15, 10, 5, 0

9/11/2018, 9/29/2018, 10/17/2018, 11/4/2018, 11/23/2018, 12/11/2018, 12/29/2018, 1/16/2019, 2/4/2019, 2/22/2019, 3/12/2019, 3/31/2019, 4/18/2019, 5/6/2019, 5/24/2019, 6/12/2019, 6/30/2019, 7/18/2019, 8/5/2019, 8/24/2019, 9/11/2019

Type of the accident

■ Selected Data

Accidents

300, 100, 10, 1, 0.10

Falling from a vehicle, Vehicle with Object, Vehicle with Vehicle - Head on, Vehicle to Vehicle, Vehicle with Pedestrian, Vehicle with Vehicle - more than 2 vehicles, Vehicle with Vehicle, Hitting a stationary vehicle, Car overturned-without crashing

Time

— Selected Data

Accidents

30, 25, 20, 15, 10, 5, 0

0:00, 2:00, 4:00, 6:00, 8:00, 10:00, 12:00, 14:00, 16:00, 18:00, 20:00, 22:00, 0:00

Day of Week

■ Selected Data

Accidents

60, 50, 40, 30, 20, 10, 0

Mon, Tue, Wed, Thu, Fri, Sat, Sun

Month

■ Selected Data

Accidents

50, 45, 40, 35, 30, 25, 20, 15, 10, 5, 0

Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec

Year

■ Selected Data

Accidents

300, 250, 200, 150, 100, 50, 0

2018, 2019

Interactive charts (date picker, linear charts, bar charts) allowing to explore and filter the data by interactive selecting in the charts
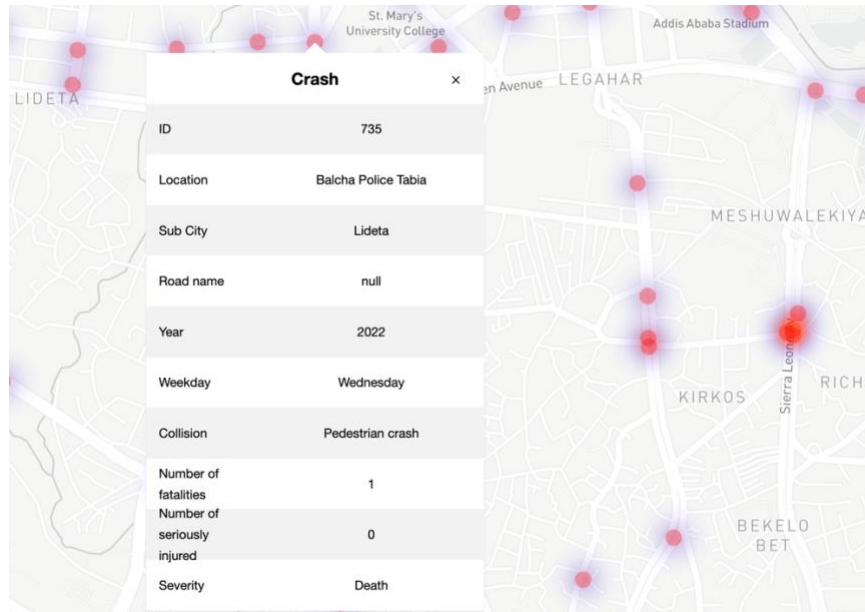
Map window with details of a single crash
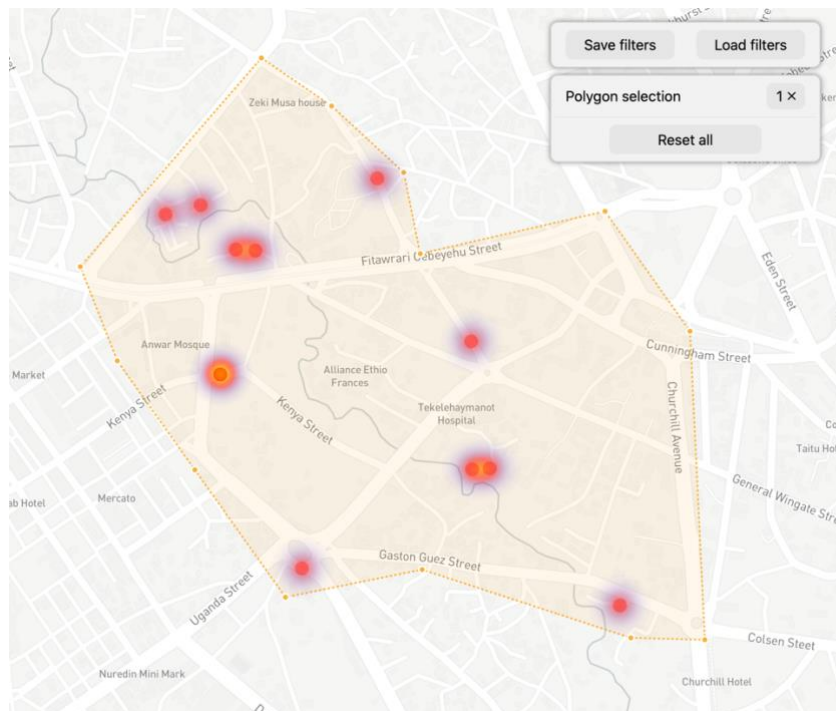
Area selection (polygon filter) allowing to analyse crashes in certain neighbourhood or street
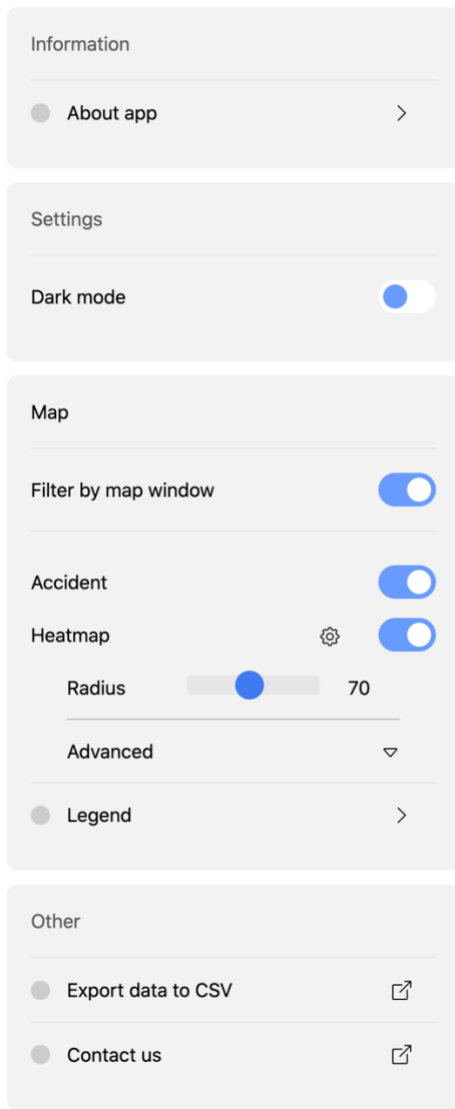
Main menu providing more details on the application (About, Legend), further setting, and CSV export of data.

III. CONCLUSIONS

The task delivered final versions of the Road Crash Analytical Map to the end-users. The solution was built to reflect the user requirements, with the data delivered by the local partners, and reflecting the feedback collected during the user testing.

The final release was presented to the end-users, the road safety experts of Addis Ababa, during the workshop on 30 August 2023 held in Addis Ababa.

በአዲስ አበባ ውስጥ የትራፊክ ደህንነት ፖሊሲን መደገፍ

ይህ ፕሮጀክት InnoConnect በተባለ የቼክ ድርጅት የቀረበ ሲሆን በተባበሩት መንግስታት የልማት ፕሮግራም በሚደገፈዉ አለም አቀፍ የመንገድ ደህንነት መርሃ ግብር ፕሮግራም የሚካተት ሲሆን የአዲስ አበባን የፖሊሲ አወጫዎች እና አስፈጻሚ አካላት ነባራዊ ሁኔታዉን በሚያሳይ መረጃ ላይ ተመስርተዉ። እንዲሰሩ በማገዝ የአዲስ አበባን የትራፊክ ደህንነት ለማሻሻል ያለም ፕሮጀክት ነዉ።

በአለም አቀፍ ደረጃ የመንገድ አደጋዎች በየዓመቱ 1.35 ሚሊዮን ህይወትን የሚቀጥፉ ሲሆን ከእነዚህ አደጋዎች 90% የሚሆኑት የሚከሰቱት ኢትዮጵያን ጨምሮ ዝቅተኛ እና መካከለኛ ገቢ ባላቸው ሀገራት ነዉ። የዓለም ጤና ድርጅት በኢትዮጵያ ከ27,000 በላይ የመንገድ አደጋዎችን ህይወት እንደሚያልፍ ቢገምትም 4,300 ያህሉ ብቻ ናቸው በይፋ የተዘገቡት፣ ይህም የመንገድ ትራፊክ ደህንነት እርምጃዎችን ማሻሻል እንደሚያስፈልግ አመልክቷል።

በብዙ የከተማ አካባቢዎች የመንገድ አስተዳደር ስርዓቱ ለኢኮኖሚያዊ ዓላማዎች ቅድሚያ መስጠት ላይ ያተኩራል። በርካታ ከተሞች የከተማ የትራፊክ እንቅስቃሴን ዕቅዶችን ቢተገብሩም የመረጃ አጠቃቀሙ የተበታተነ በመሆኑ በባራዊ ሁኔታ ላይ የተመሰረተ የትራፊክ ደህንነት ፖሊሲዎች እንዳይዘጋጁ እንቅፋት ሆነዋል። በዚህም መነሻነት ፕሮጀክቱ ጠንካራ የመንገድ ትራፊክ ደህንነት አስተዳደርን ወሳኝ ሚና ላይ አፅንዖት በመስጠት የቀረበ ነዉ።

ፕሮጀክቱ አንድ አመት የፈጀ ሲሆን የትራፊክ አደጋ የትንታኔ ካርታን በተለያዩ መንገዶች ያሳየ ሲሆን በየደረጃዉ በተጨማሚያ ግምገማ እንዲደረግ በማድረግ እና ከአዲስ አበባ የትራፊክ አስተዳደር ኤጀንሲ ተጨማሪ የመንገድ አደጋ መረጃዎችን በማካተት የተዘጋጀ ነዉ።

እ.ኤ.አ. በነሀሴ 2023 በተካሄደዉ በመንገድ ደህንነት ወርክሾፕ ላይ ኢኖ ኮኔክት (InnoConnect) የአዲስ አበባን የትራፊክ አደጋ ትንተና የሚያሳይ ካርታ አስተዋዉቋል። ይህም ሞት እና ከባድ ጉዳት የትራፊክ አደጋዎችን ለመቀነስ ዉጤታማ እርምጃዎችን ለመውሰድ ውሳኔ ሰጪ አካላት በዉጤት ላይ የተመሰረቱ ተሞክሮዎችን እንዲወስዱ አግዟል። ቁልፍ ባለድርሻ አካላት፣ የአዲስ አበባ የትራፊክ አስተዳደር ኤጀንሲ፣ የትራፊክ ፖሊስ፣ ጂ ኤንድ ዋይ የምህንድስና አማካሪ ኃ.የተ.የግ.ማ (G and Y engineering consult plc) እና ብሉምበርግ ኢኒሼቲቭ ፎር ግሎባል ሮድ ሴፍቲ በመረጃ አሰባሰብ፣ አተረጓጎም እና የመንገድ ደህንነት ፖሊሲዎች ላይ ውይይት አድርገዋል።

ትክክለኛ የትራፊክ የአደጋ መረጃ አሰባሰብ ስርዓት መካተል ዋና የመወያያ ርእስ የነበረ ሲሆን የአዲስ አበባ የትራፊክ አስተዳደር ኤጀንሲ ከብሉምበርግ ኢኒሼቲቭ ድጋፍ ጋር በኤሌክትሮኒካዊ የአደጋ ቅጾችን እና የስራተኞች ስልጠናን ጨምሮ የመረጃ አሰባሰብ ሂደቶችን በማሻሻል ረገድ ከፍተኛ እርምጃ አያደረገ ይገኛል። የአደጋ መረጃን በከተማ አቀፍ ደረጃ ለማከማቸት የተቀናጀ የአይቲ መሠረተ ልማትም በመገንባት ላይ ነዉ።

የትራፊክ አደጋ ትንተና ካርታ፣ የአደጋ መረጃን በጥልቀት ለመተንተን፣ ለአደጋ የተጋለጡ ቦታዎችን ለመለየት እና ለከባድ አደጋዎች አስተዋፅዖ የሚያደርጉ ነገሮችን በጥልቀት ለመረዳት ያስችላል። ፕሮጀክቱ ለአዲስ አበባ የመንገድ ትራፊክ ደህንነት ባለሙያዎች የሰጠው ምክር ህሳብ የመረጃ ጥራትን ማሻሻል፣ የፖሊስ አባላትን ማሰልጠን፣ የተቀናጀ የመረጃ አሰባሰብ ሂደት መዘርጋት፣ የተማከለ የመረጃ ቋት መፍጠር እና የመንገድ ትራፊክ አደጋ መረጃዎችን በማሸን ሊከብ የሚችል ህትመትን ጨምሮ ወሳኝ ጉዳዮችን ያካተተ ነዉ።

የትራፊክ አደጋ ትንተና ካርታዉ በአዲስ አበባ ለፖሊሲ ማውጣት እና ለዕለታዊ የፖሊስ ተግባራት እንደ ጠቃሚ ሆኖ ተገኝቷል። የትራፊክ የአደጋ የሚበዛባቸዉን ቦታዎች ለማሻሻል፣ ዝቅተኛ ፍጥነት ወሰን የሚያስፈልጋቸዉን አካባቢዎች ለመለየት፣ በመረጃ የሚመራ ፖሊስ

ለመቀረጽ፣ ክትትል እና ግምገማ ለማድረግ፣ የማሻሻያ ስራዎችን ውጤታማነት ለመገምገም እና የመንገድ መጋጠሚያ ማሻሻያ ስራዎችን ለመተግበር ያግዛል።

በአጣቃላይ አንድ አመት በፈጀዉ ሂደት ዉስጥ ፕሮጀክቱ የአዲስ አበባን የትራፊክ ደህንነት ችግርን ለመቀረፍ ከፍተኛ አስተዋፅኦ እንደሚያደርግ ታምኖበታል። የትራፊክ አደጋ ትንተና ካርታዉ የሚጠቀሙበት አካላት እንዲገመግሙት እና ግብአት እንዲሰጡበት በማድረግ እና መረጃዎችን በመጠቀም የጎለበተ ሲሆን በማስረጃ ላይ የተመሰረተ ዉሳኔ ለመስጠት እና በከተማዉ መንገዶች ላይ በትራፊክ አደጋ የሚጠቀጠፈዉን ህይወት ለማዳን እንደሚያግዝ ይታመናል።
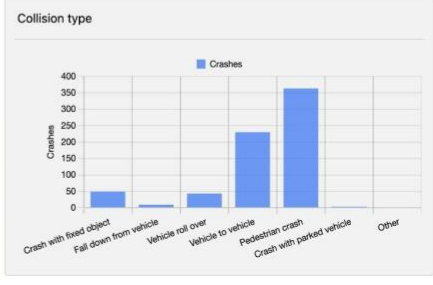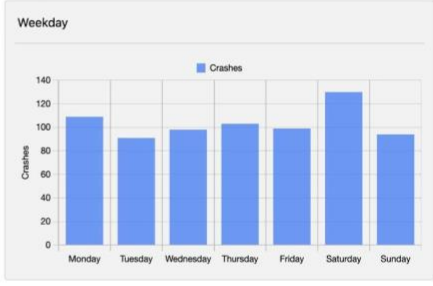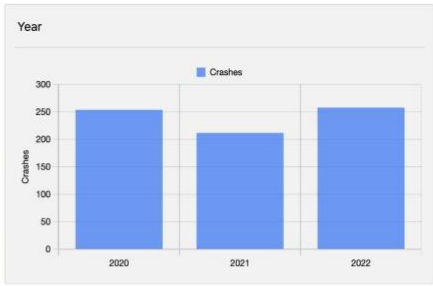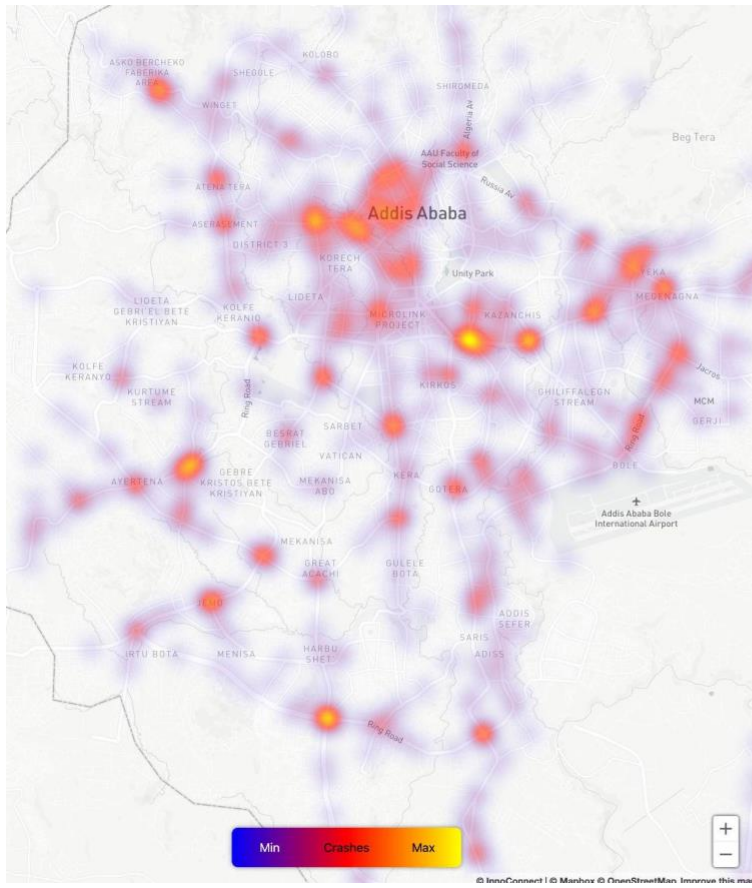
ይህ በኢትዮጵያ ከፍተኛ የትራፊክ አደጋ ስጋት ያለባቸውን ቦታዎች በመለየት ደህንነቱን ማሻሻል የተሰኘው ፕሮጀክት በቼክ ሪፐብሊክ መሰረቱን ባደረገዉ እና በትራንስፖርትና ተያያዥ ፕሮጀክቶች ላይ ትኩረት አድርጎ በሚሰራዉ InnoConnect በተባለ ድርጅት የቀረበ ነዉ። ፕሮጀክቱ በተባበሩት መንግስታት የልማት ፕሮግራም (Czech-UNDP Challenge Fund) በቼክ ሪፐብሊክ የዉጭ ጉዳይ ሚኒስቴር የገንዘብ ድጋፍ አግኝቷል።

በፕሮጀክቱ ላይ አጋር ድርጅት ሆኖ የሰራዉ G and Y Engineering Consult PLC. እና የአዲስ አበባ ከተማ አስተዳደር ትራፊክ ማኔጅመንት ኤጀንሲ ተሳትፈዋል።