Green Swarm: Greener Routes with Bio-inspired Techniques

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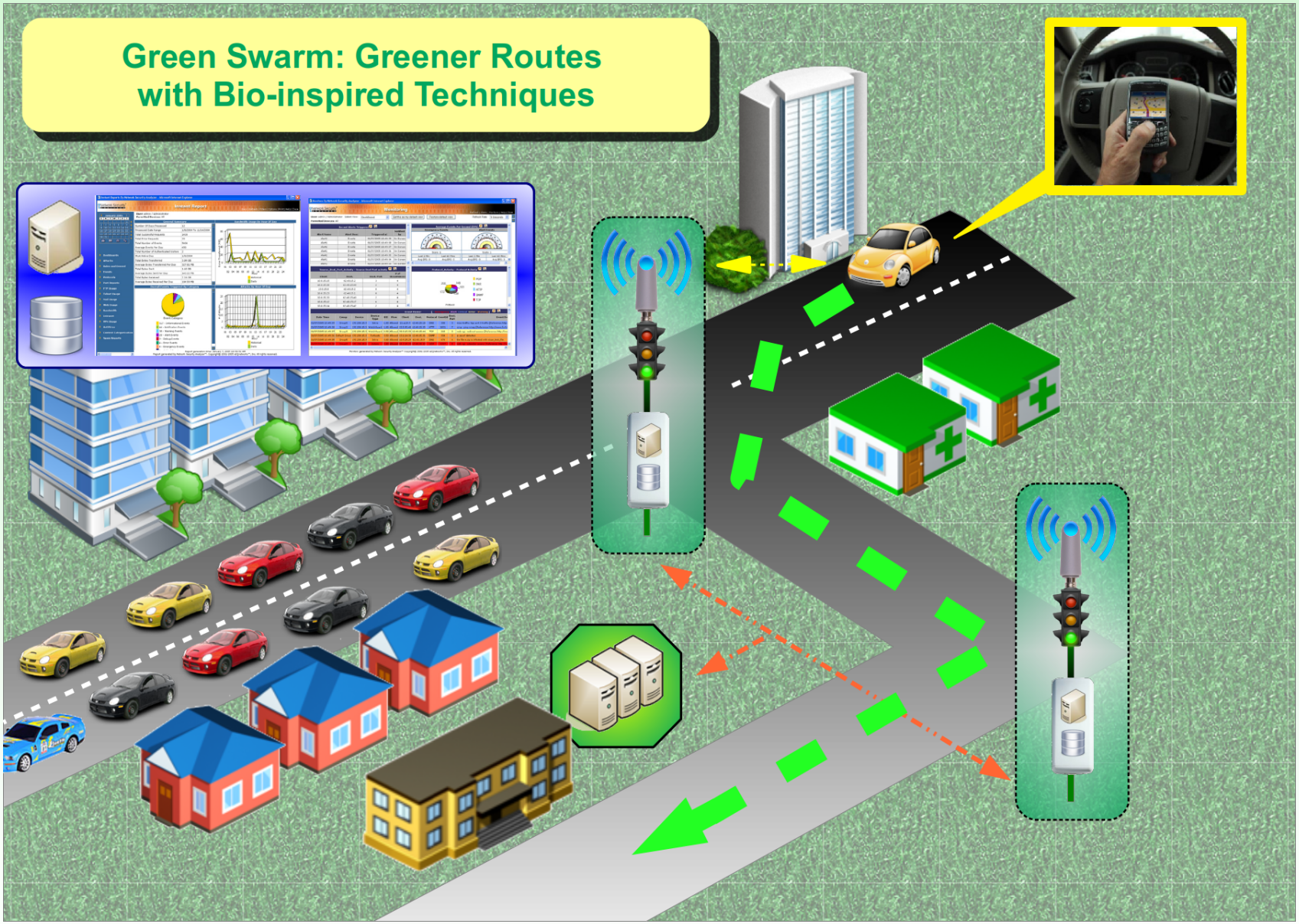
Humies
(Human Competitive Results Awards)

GECCO 2019

July 15th 2019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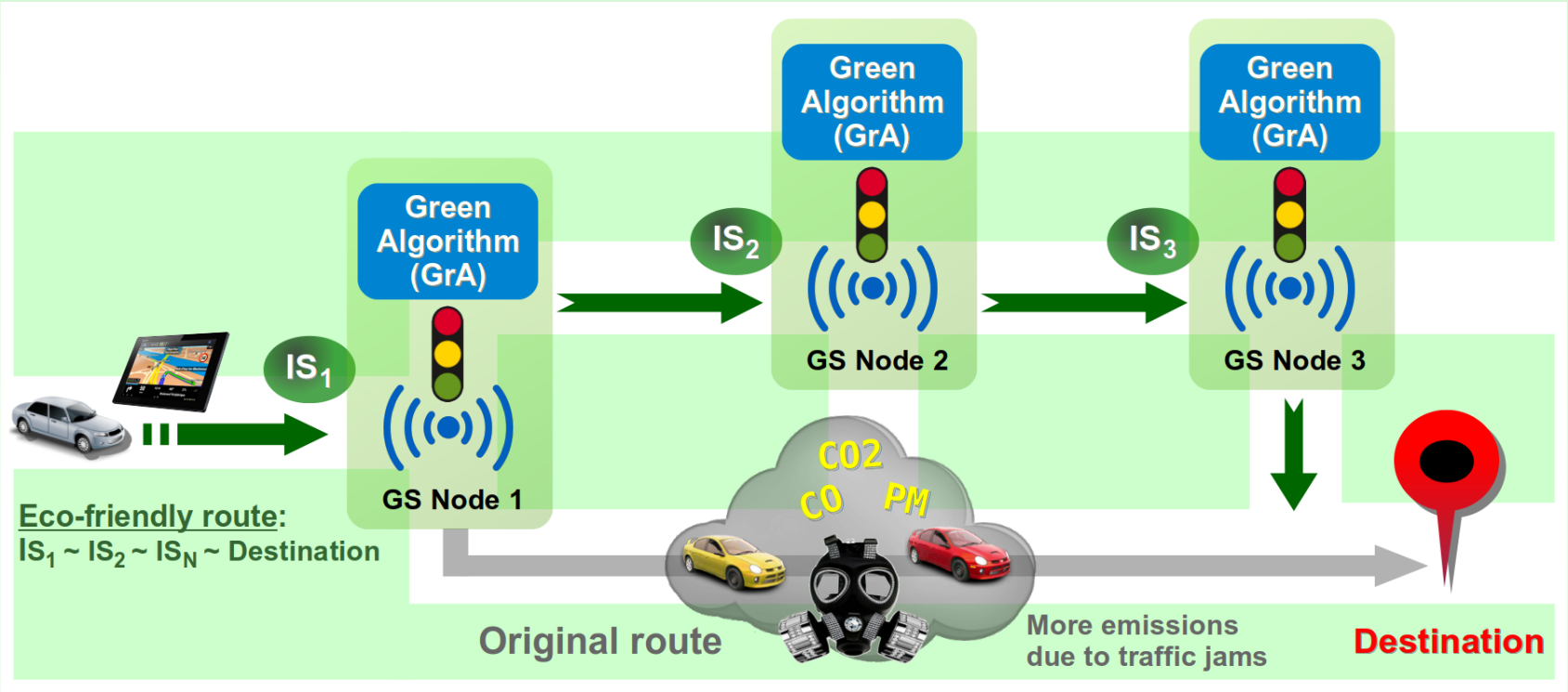
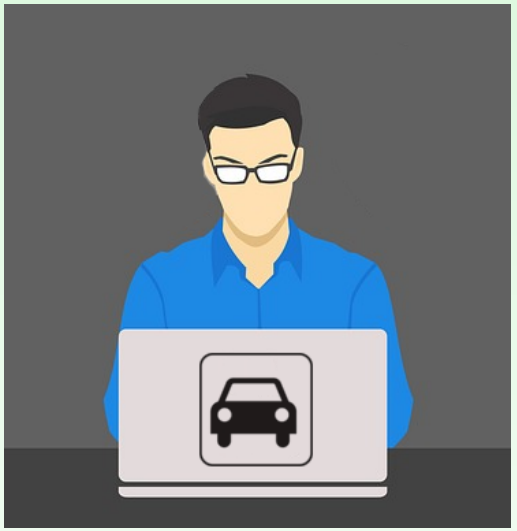
Eco-Friendly Routes



- ✔ Routes are customized for every driver
- ✔ Routes take into account the whole city
- ✔ Routes take into account time, distance, and pollution
- ✔ Routes evolve as drivers follow them

Human Traffic Authorities

- ✔ Grounded experts
- ✔ Knowledge of the city
- ✔ Years of experience
- ✔ They drive by the city's streets



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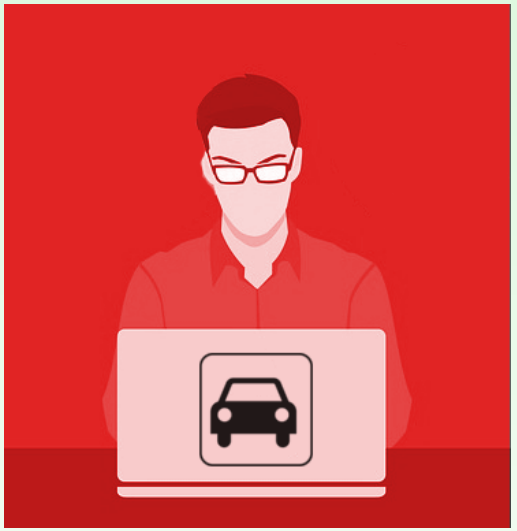
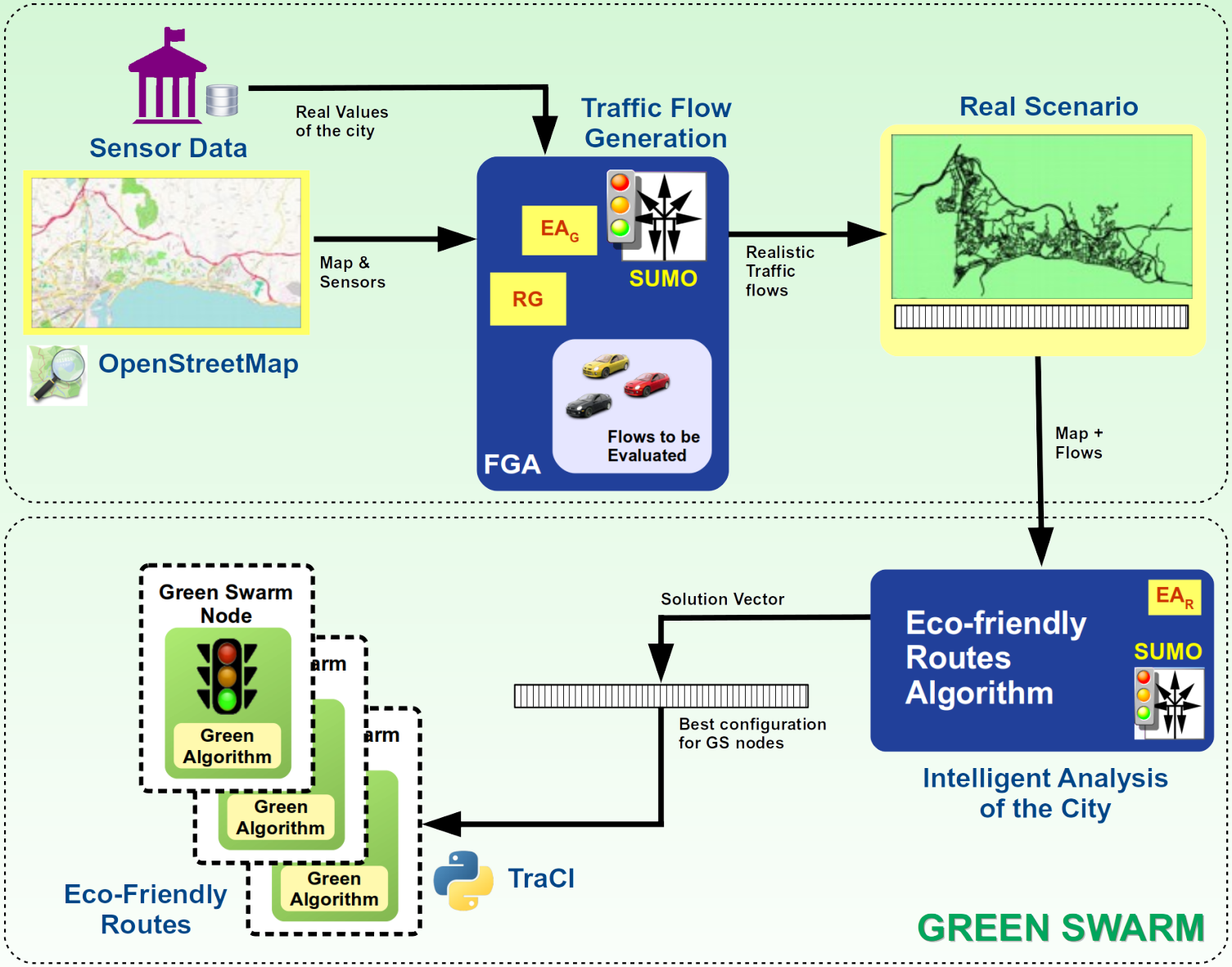


- ✖ Bias in results
- ✖ Personal preferences
- ✖ Personal feelings
- ✖ Hidden side effects
- ✖ Time, effort, brain limitations to deal with all the details

Real Problem

- Minimizing greenhouse gas emissions, fuel consumption and travel times
- Actual cities are complex:
  - traffic lights
  - street lanes
  - roundabouts
  - left turns
  - type of vehicles
  - etc.
- Many possible routes
- Up to ...
  - 5800 vehicles
  - 89 traffic lights
  - 1314 route segments

Smart Solution: Evolutionary Technique



Outperforming Humans

Human Strategies:

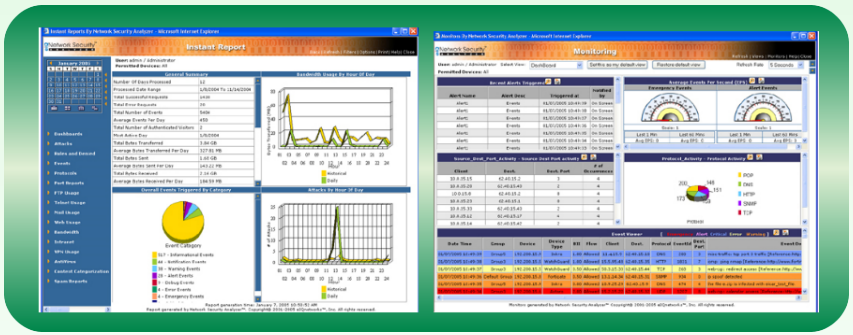
- 20% less vehicles in streets
  - ✖ Does not reduce emissions
- 30 km/h maximum speed
  - ✖ Increase street congestion
- Replacing trucks by 50% more sedans and vans
  - ✖ More vehicles imply longer travel time

Green Swarm works better alone or combined with them:

- Up to ...
  - ✔ 67% shorter travel times
  - ✔ 81% less emissions
  - ✔ 52% fuel saving

Impact in the Society

- Traffic jam prevention
- Less pollution
- Less stressful trips
- Improvements on the economy of the city
- Healthy and happy citizens



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