



**Law Enforcement agencies human factor methods and Toolkit
for the Security and protection of CROWDs in mass gatherings**

In this issue

LETSCROWD Newsletter 3. Editorial and project official video. November 2019	1
How to communicate with multicultural crowds in mass gatherings – The LETSCROWD Communication Toolkit (Toolcard and PDF Toolkit)	3
Semantic Intelligence Engine – SIE (Toolcard and video).....	6
Real Time Evacuation – RTE (Toolcard and video)	8
Crowd Modelling and Planning Tool – CMPT (Toolcard and video)	10
Human Centred Computer Vision Tool – HCV (Toolcard and 3 videos).....	12
Dynamic Risk Assessment – DRA (Toolcard).....	16
LETSCROWD Server (Toolcard and Video).....	18
LETSCROWD Publications	20



LETSCROWD Newsletter 3. Editorial and project official video. November 2019

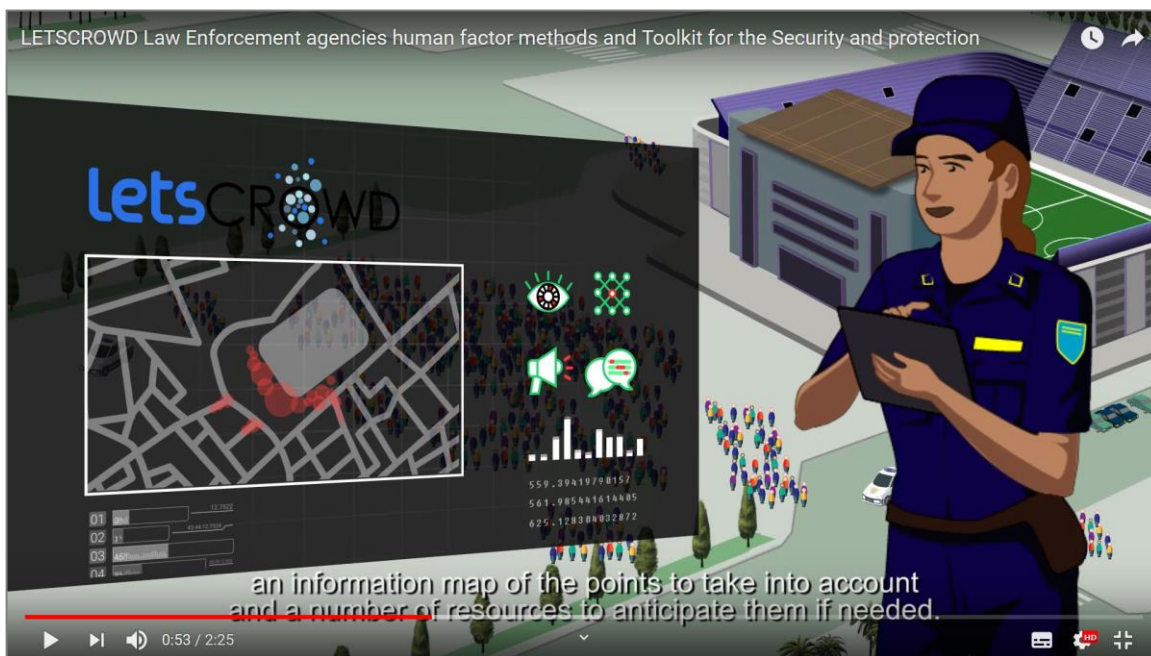
Dear Friend,

LETSCROWD is a project that developed an integrated system for crowd protection during mass gatherings, by providing a set of tools to Law Enforcement Agencies and security policy practitioners, including:

- a communication toolkit that aims at improving event organisers, security officers and first responders' crowd awareness and intercultural competences in the pre-event and execution phases of the events;
- a set of human centred softwares for LEAs, including real time crowd behaviour forecasting, semantic intelligence applied to social networks and the internet, and novel computer vision techniques;
- a dynamic risk assessment methodology for the protection of crowds during mass gatherings, centred on human factors, in order to effectively produce policies and deploy adequate solutions;
- a training package for LEAs, to enhance capabilities and skills in identification of suspicious signs in behaviour and appearance that might indicate a possible connection of an individual or group to intentional criminal or terrorist activity;
- a LETSCROWD Server, that aggregates and integrates the LETSCROWD existing tools.

With the recent conclusion of the LETSCROWD activities we are glad to share, through videos and infographics/presentation cards, part of the outcomes of the project with the community, and details on the functioning of developed tools.

We are sure you will find interesting the contents of this third newsletter, and hence we would like to invite you to read on.

LETSCROWD official video

an information map of the points to take into account
and a number of resources to anticipate them if needed.

The video is available at:

<https://letscrowd.eu/video>

How to communicate with multicultural crowds in mass gatherings – The LETSCROWD Communication Toolkit (Toolcard and PDF Toolkit)

Alessia Golfetti, Sabina Giorgi - Deep Blue

LETSCROWD Communication Toolkit - Toolcard

LETSCROWD tool presentation cards

LETSCROWD - Law Enforcement agencies human factor methods and Toolkit for the Security and protection of CROWDS in mass gatherings - aims to develop an integrated system for crowd protection during mass gatherings, by providing the following to security policy practitioners:

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LETSCROWD Communication Toolkit



HOW TO COMMUNICATE WITH MULTICULTURAL CROWDS IN MASS GATHERINGS

COMMUNICATION TOOLKIT



The communication toolkit **"How to communicate with multicultural crowds in mass gatherings"** aims at improving event organisers, security officers and first responders' crowd awareness and intercultural competences in the prevent and execution phases of the event. The communication toolkit consists of two main sections:

- SECTION #1** presents the highlights of the literature review on three main topics: socio-cultural issues relevant for communicating with the crowd in mass gathering events, crowd behaviours in emergencies and the key elements of the communication process.
- SECTION #2** provides five different communication tools that can be used to define the communication strategy for a specific event:
 - General communication guidelines
 - Triggering questions
 - Templates
 - Specific communication guidelines for sporting events, festivals and concerts
 - Emergency communication cards

IN SHORT: toolkit for an effective communication with multicultural crowds in mass gatherings in normal and critical situations.

COMMUNICATION TOOLKIT PDF: www.letscrowd.eu/communication-toolkit

WHO IS THIS TOOL FOR?

- Event organizers
- Law Enforcement Agencies (LEAs)
- Security officers
- First responders

WHAT IS THE ADDED VALUE OR BENEFITS FOR LEAs OPERATORS AND OTHER STAKEHOLDERS?

- Supporting key stakeholders in building-up their context-specific communication strategy.
- Supporting the process of collecting and organizing available information, to enhance the preparedness and the communication effectiveness.

WHEN SHOULD THE TOOL BE USED?

During the preparation and execution phases of a mass gathering event.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under the grant agreement N° 740466.



Funded by the European Commission under the H2020 Programme

www.letscrowd.eu

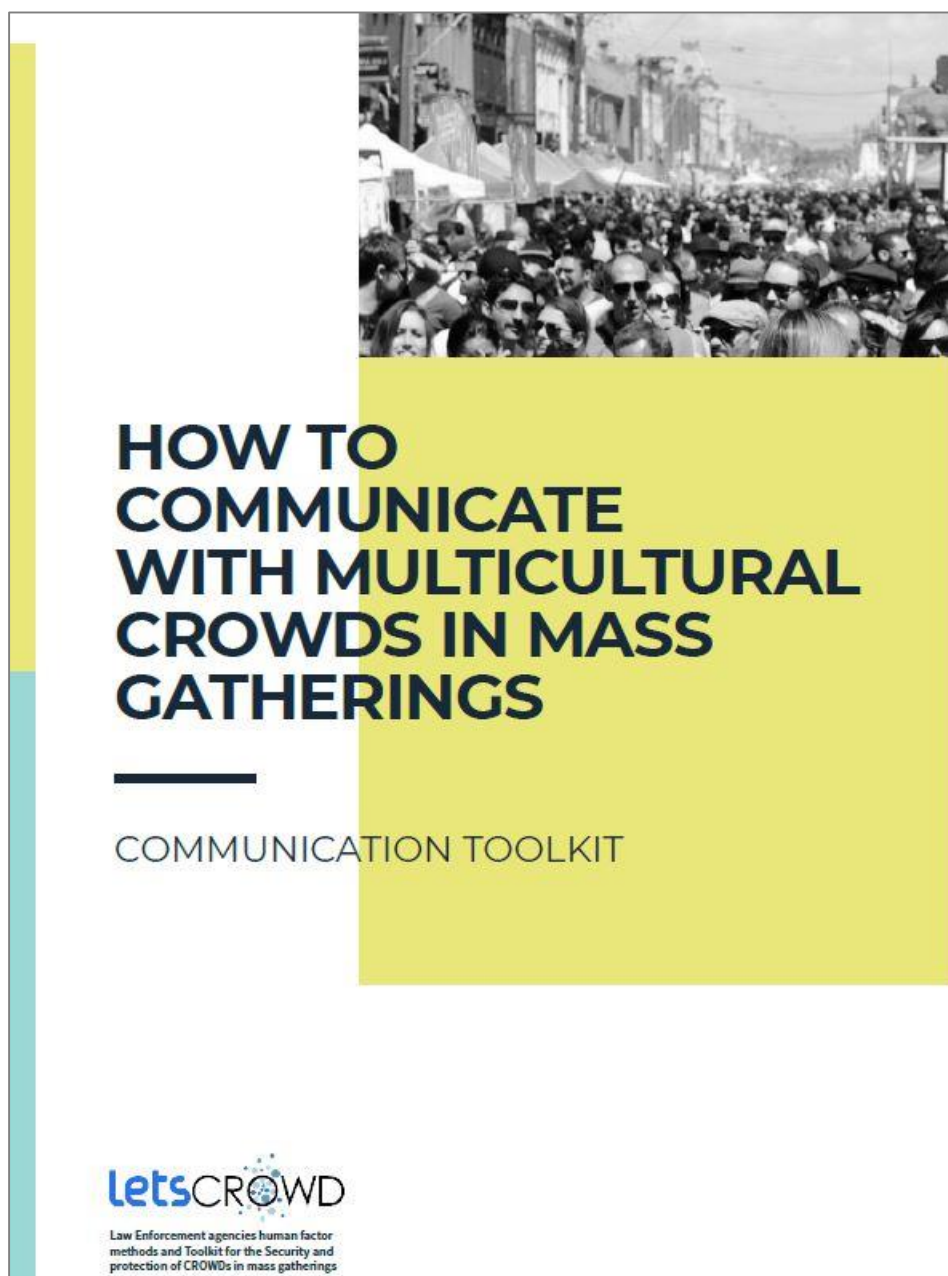


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[linkedin.com/in/lets-crowd-project](https://www.linkedin.com/in/lets-crowd-project)

LETSCROWD Communication Toolkit - PDF Toolkit



The PDF document (20,4 MB) is downloadable from:

<https://letscrowd.eu/communication-toolkit>

Deep Blue (DB) is a research and consultancy Italian SME, specialized in human factor, safety, security, validation and scientific dissemination. The company operates in contexts with high safety, security and resilience requirements, such as Transport, Healthcare and Energy.

<https://dblue.it>

Deep Blue



Semantic Intelligence Engine – SIE (Toolcard and video)

Andres Garcia-Silva, Jose Manuel Gomez-Perez, Cristian Berrio Aroca - Expert System Spain;
Alessio Mulas, Davide Ariu - Pluribus One

LETSCROWD Semantic Intelligence Engine - Toolcard

LETSCROWD tool presentation cards

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Human Factors

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LETSCROWD Semantic Intelligence Engine (SIE)





The Semantic Intelligence Engine (SIE) is composed of several modules that together enable a security analyst to gather information from web resources and analyse the resulting intelligence from a security perspective. A dual approach based on monitoring and inspection.

- The Web Crawler** gathers information from several web-based resources in total respect of all legal and ethical boundaries. Crawled sources are open (OSINT) and social media oriented (SOCMINT).
- Cogito Intelligence**, Expert System's cognitive technology product, processes extracted text and enriches it with content-based semantic metadata, enabling advanced data analysis and inspection.
- The Dashboard** provides users with a high-level indicator-based unified view of the documents gathered about a given mass gathering event. The provided dashboard is interactive and dynamic and allows user to filter and inspect documents.

IN SHORT: OSINT and Cognitive Technologies for the Security of Mass Gathering Events.

VIDEO: youtu.be/IV2RTUWk144

WHO IS THIS TOOL FOR?
Security analysts involved in mass gathering events who ordinarily monitor many web resources and manually inspect large amount of text-based evidence.

WHAT IS THE ADDED VALUE OR BENEFITS FOR LEAS OPERATORS AND OTHER STAKEHOLDERS?

- Built-in unified access to a wide range of web resources.
- Flexible and customizable solution to add new data sources.
- Speed-up and focus analyst work by extracting meaningful information and insights.
- Powerful high-level visualization tool and drill down capabilities.

WHEN SHOULD THE TOOL BE USED?
The SIE can be used during all the phases of the event to fulfil different roles. Before the event to help decision makers, during the event to monitor key web sources, after the event to further analysis all extracted data.




This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under the grant agreement N° 740466.

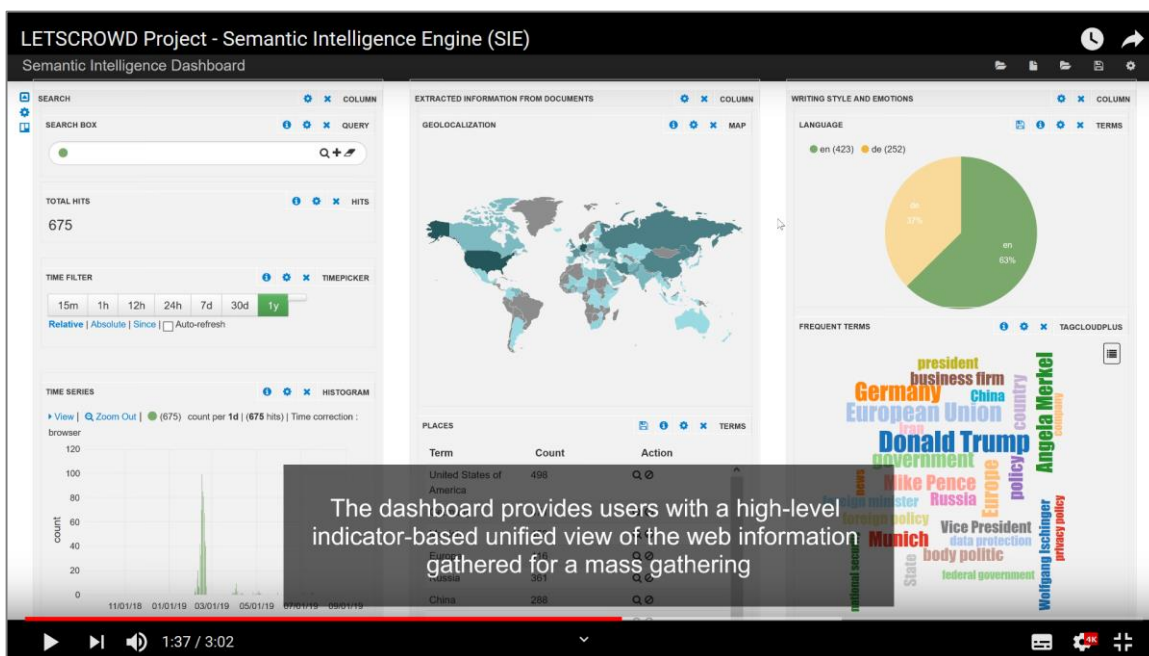
www.letscrowd.eu

linkedin.com/in/lets-crowd-project

[@LetsCrowd](https://twitter.com/LetsCrowd)



LETSCROWD Semantic Intelligence Engine - Video



The video is available at:

<https://letscrowd.eu/sie-video>

Founded in 1989, Expert System S.p.A. is a big player in the big data analytics and semantic intelligence market that has developed a proprietary state-of-the-art software technology that understands the meaning of written language. Expert System is headquartered in Modena, Italy and has branches in US, UK, France, Spain and Germany. Expert System participates in LETSCROWD through the Spanish branch, specialized in NLP and semantic technologies.

www.expertsystem.com

Expert System S.p.A.



Linked third party of PRA Lab - UNICA (the University of Cagliari), Pluribus One S.r.l is a research-intensive company based in Italy focused on providing innovative solutions for cyber security, machine vision, and other data-driven applications. Pluribus One is involved in LETSCROWD in the development of the focused crawling engine for the COGITO semantic engine, and in the use cases on cyber attacks and cyber crime.

www.pluribus-one.it

Pluribus One S.r.l



Real Time Evacuation – RTE (Toolcard and video)

Arturo Cuesta, Daniel Alvear, Orlando Abreu - University of Cantabria

LETSCROWD Real Time Evacuation - Toolcard

LETSCROWD tool presentation cards

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LETSCROWD Real Time Evacuation Tool (RTE)



The RTE tool is a software to simulate the evacuation of crowds at mass gatherings providing results in real-time. The model configuration involves:

- Event: The user defines the crowd size, the number and width of the available exits and the distance from the crowd to each exit.
- Key random parameters: the user can modify the people response times, walking speeds and flows through the exits.



The tool performs hundreds of simulations for the same scenario to capture all potential outcomes. The outputs are the total evacuation times, the evacuation times per exit and the exit use.

The user can easily assess different scenarios by directly change exit availability, potential exit use and/or key random parameters.

IN SHORT: Real-time evacuation modelling and simulation for mass gatherings

VIDEO: you.be.com/Xh5aUmBcUK8

WHO IS THIS TOOL FOR?
The RTE tool is designed for LEAS (those units in charge of security management) and stakeholders in charge of safety of mass gathering events.

WHAT IS THE ADDED VALUE OR BENEFITS FOR LEAS OPERATORS AND OTHER STAKEHOLDERS?

- Easy to use.
- For outdoor and indoor events.
- Stochastic approach.
- Results in a few seconds.
- Useful for planning and real-time decision-making.
- Validated against real environment conditions.

WHEN SHOULD THE TOOL BE USED?
Both for Event planning and during the event to:

- Explore the impact of actual or potential incidents.
- Define actual or potential evacuation strategies.

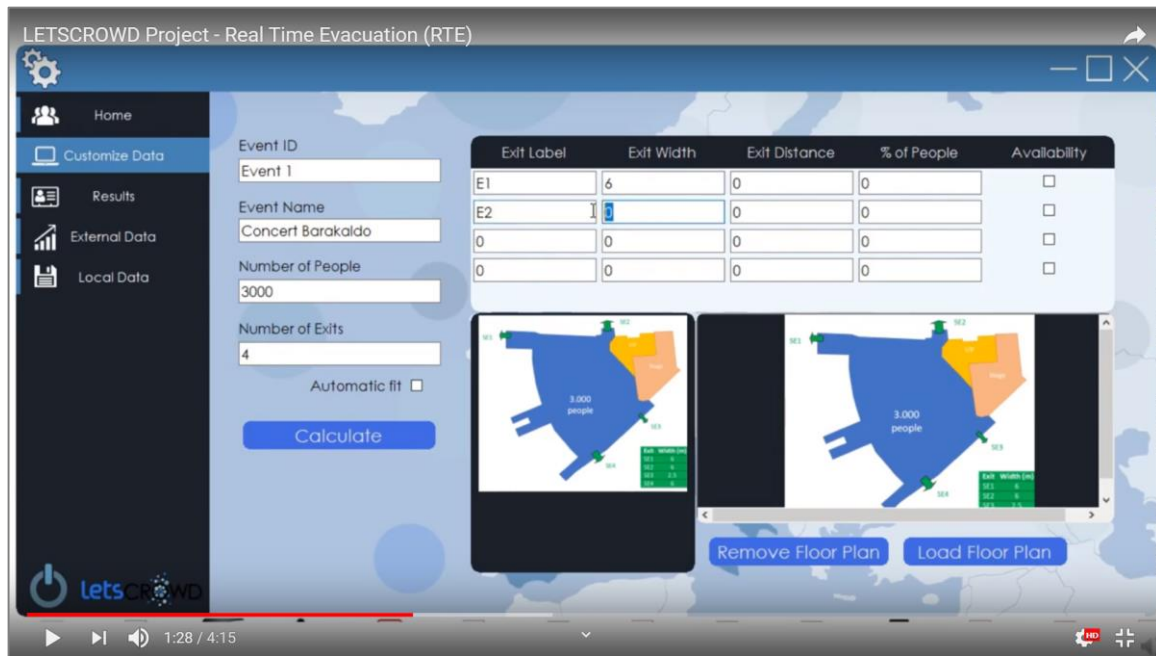


www.letscrowd.eu
linkedin.com/in/lets-crowd-project
[@LetsCrowd](https://twitter.com/LetsCrowd)



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under the grant agreement N° 740466.

LETSCROWD Real Time Evacuation - Video



The video is available at:

<https://letscrowd.eu/rte-video>

For almost 20 years the Research Group GIDAI – Fire Safety – Research and Technology University of Cantabria has been undertaking intensive research, technology transfer and training activities in the fields of human behavior in emergency conditions and fire science as well as the dissemination of relevant information to society in order to improve fire safety which has led it to become a national and international reference in this scientific field of expertise.

<http://web.unican.es>

Research Group GIDAI – University of Cantabria



Crowd Modelling and Planning Tool – CMPT (Toolcard and video)

Dan Jeffery, Paul Townsend - Crowd Dynamics

LETSCROWD Crowd Modelling and Planning Tool - Toolcard

LETSCROWD tool presentation cards

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LETSCROWD Crowd Modelling and Planning Tool




The CMPT is a collection of advanced crowd simulations that allow enforcement agencies to analyse crowd behavior at mass gatherings for planning, training or operational uses.

When should the CMPT be used?

- Before a mass gathering occurs to understand likely situation and risk, to plan or test LEA responses to potential incidents, to plan or test crowd management strategies.
- During operation of a mass gathering, in real-time to aid operational decision making by providing a forecast of crowd behavior.

What should the CMPT model?

- Crowd movement patterns and density levels that are expected at an event.
- Evacuation of the mass gathering.
- Crowd management strategies (e.g. rerouting crowds).
- LEA intervention tactics.
- Communication strategies (placement of information sources).

IN SHORT: Software to plan for crowds attending a mass gathering, to simulate the crowd movement in normal and emergency situations, and to display the results in understandable ways, in 3D.

VIDEO: youtu.be/HoP_1kOvq_U

WHO IS THIS TOOL FOR?
The tool is for use by LEAs who wish to assess crowds at events and mass gatherings. It can also be used by expert advisors such as security companies, event organisers or engineers and architects.

WHAT IS THE ADDED VALUE OR BENEFITS FOR LEAS OPERATORS AND OTHER STAKEHOLDERS?
The added value of the tool is that crowd movements, area capacities, strategies for intervention or management can all be tested in advance of an event to enable prevention of crowd related incidents. This is also true during the event, where strategies to move, disperse or evacuate crowds can be simulated and tested to get better awareness of potential impact *before* implementation. This will allow much better situational awareness through prediction and lead to better decision making in prevention of unwanted accidents.

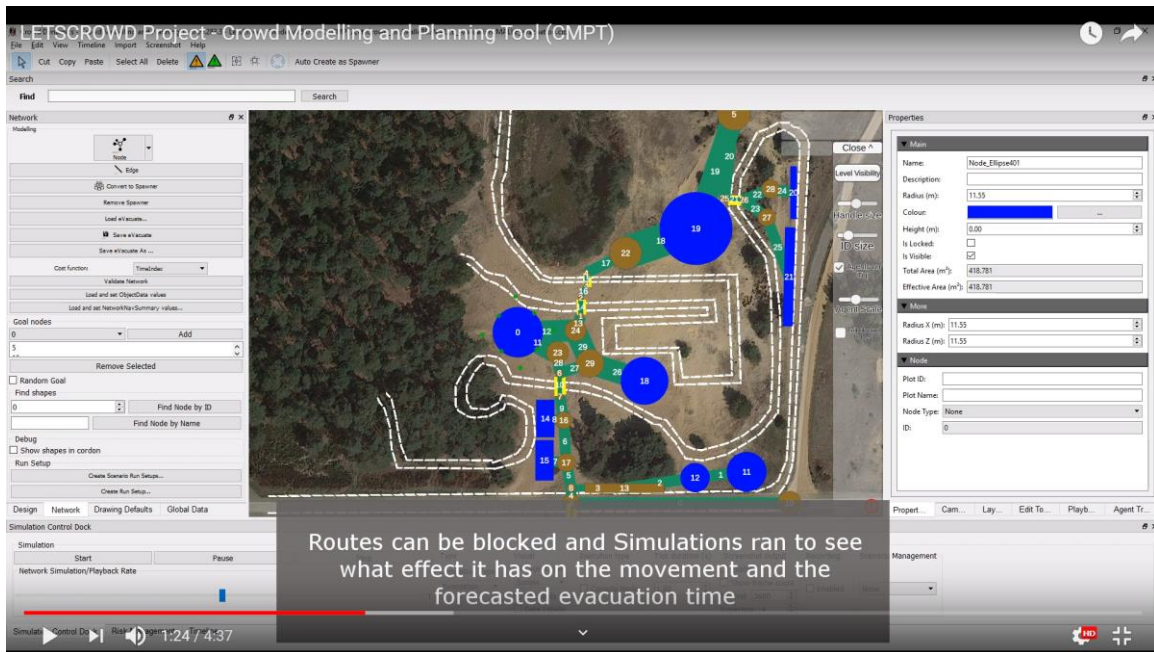
WHEN SHOULD THE TOOL BE USED?
The tool is useful throughout all phases of an event, even for unplanned events such as spontaneous protests. It would normally be used to plan for crowds at mass gatherings, testing scenarios before the event happens, assessing consequences of risk to the crowd of certain management techniques etc. It would then be used during operations to test certain scenarios like closing streets, the potential impact of police crowd control tactics or crowd management as it changes through the event. Post event, it can be used to assess what could have been improved, why crowd movement was impeded in different situations.





This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under the grant agreement N° 740466.

LETSCROWD Crowd Modelling and Planning Tool - Video



The video is available at:

<https://letscrowd.eu/cmpt-video>

Crowd Dynamics International Ltd has a widespread client base and global reputation. Over many years, our experienced team of specialists has fine-tuned the science of Crowd Dynamics. The company's software developers have turned this specialist knowledge into practical modelling packages, with the goal of maximising capacity, space and efficiency while minimising risk. Such tools include real-time analysis of crowds.

<http://www.crowddynamics.com>

Crowd Dynamics International Limited



Human Centred Computer Vision Tool – HCV (Toolcard and 3 videos)

Giorgio Fumera, Rita Delussu, Lorenzo Putzu, Matteo Mauri - PRA Lab, University of Cagliari

LETSCROWD Human Centred Computer Vision Tool - Toolcard

LETSCROWD tool presentation cards

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LETSCROWD Human Centred Computer Vision Tool





The Human Centred Computer Vision (HCV) tool provides three functionalities aimed at supporting LEA operators and forensic investigators in the use of video surveillance systems for monitoring and investigation activities during and after mass gathering events.

The HCV tool comprises the following modules:

- Appearance-based person re-identification**, to search for an individual of interest in several recorded videos, based on clothing appearance, using an image as a query.
- Attribute-based people search**, to search in several recorded videos for individuals who match an attribute profile of clothing appearance (e.g., colours), gender, carried items.
- Crowd counting**, for real-time estimation of crowd size and detection of related anomalous behaviours, e.g.: overcrowding with respect to a user-defined threshold, sudden increase or decrease of crowd size.

IN SHORT: Video analytics technologies for the security of mass gathering events.

VIDEOS: 1. youtu.be/RLJwB2PFEH0 2. youtu.be/gBHnCph7eh0 3. youtu.be/28BPgGtCQLQ

WHO IS THIS TOOL FOR?
LEA operators and forensic investigators using video surveillance systems for monitoring and investigation activities during mass gathering events.

WHAT IS THE ADDED VALUE OR BENEFITS FOR LEAS OPERATORS AND OTHER STAKEHOLDERS?

- Reducing LEA operators' burden in real-time crowd monitoring tasks during event execution.
- Reducing forensic investigators' effort and time to search for suspect individuals in recorded videos during post-event investigations of crimes and incidents.

WHEN SHOULD THE TOOL BE USED?

- During event execution, to monitor the size of a crowd in one or more regions of interest of the event venue.
- After a mass gathering event, in forensic investigations on crimes or incidents, to search for suspect individuals in the videos recorded by video surveillance systems.



letsCROWD



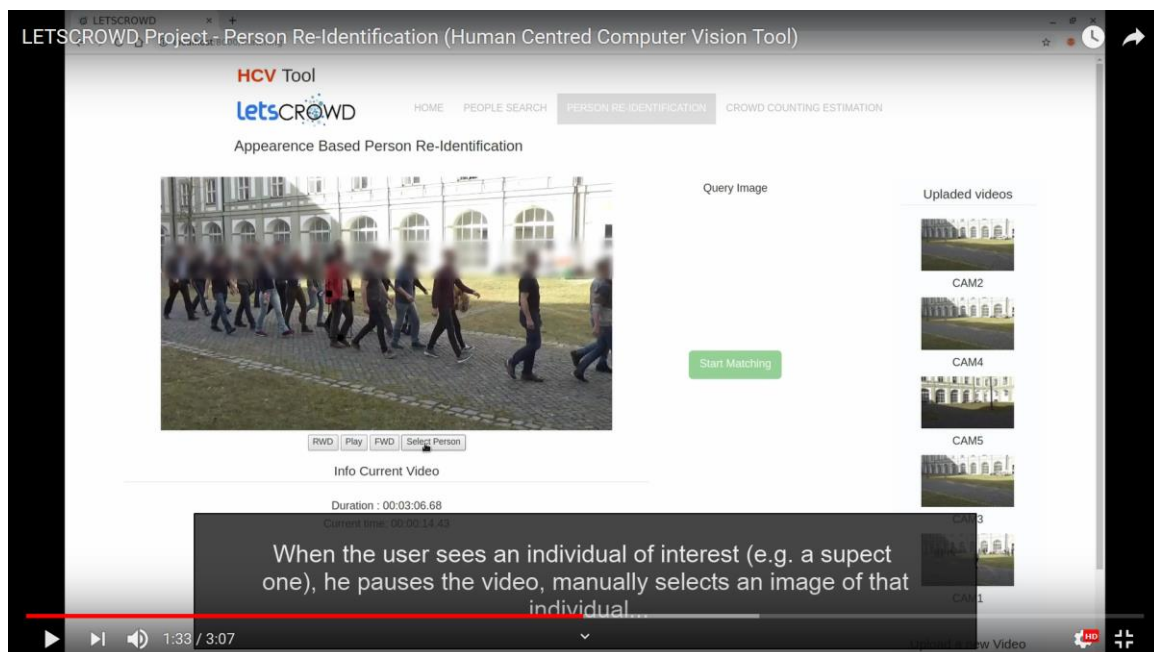
This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under the grant agreement N° 740466.

Three specific prototype tools have been developed as part of the HCV tool: appearance-based person re-identification, attribute-based people search, crowd counting and density estimation.

Appearance-based person re-identification

Appearance-based person re-identification systems can support LEA operators and forensic investigators by automatically **retrieving images of an individual of interest based on clothing appearance** to a query image of the same individual manually selected by the user from a video frame.

LETSCROWD Person Re-Identification (Human Centred Computer Vision Tool) - Video



The video is available at:

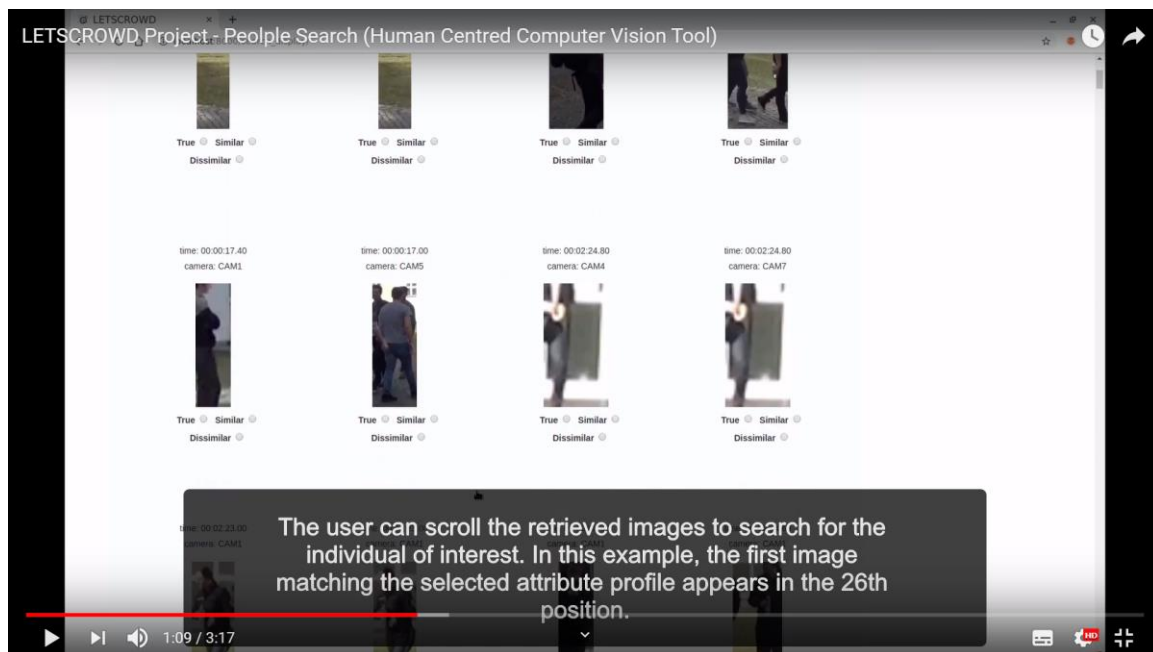
<https://letscrowd.eu/hcv-re-id-video>

This video is a short demo with blurred contents, due to privacy reasons. A longer version of the video, without obfuscated contents, is available for scientific purposes. [Contact us](#) for more information.

Attribute-based people search

Attribute-based people search systems allow the user to input the attribute profile of an individual of interest in terms of a predefined set of attributes, such as the colours of upper and lower body clothing, gender, and carried items, and then automatically retrieve images of individuals exhibiting a similar attribute profile.

LETSCROWD People Search (Human Centred Computer Vision Tool) - Video



The video is available at:

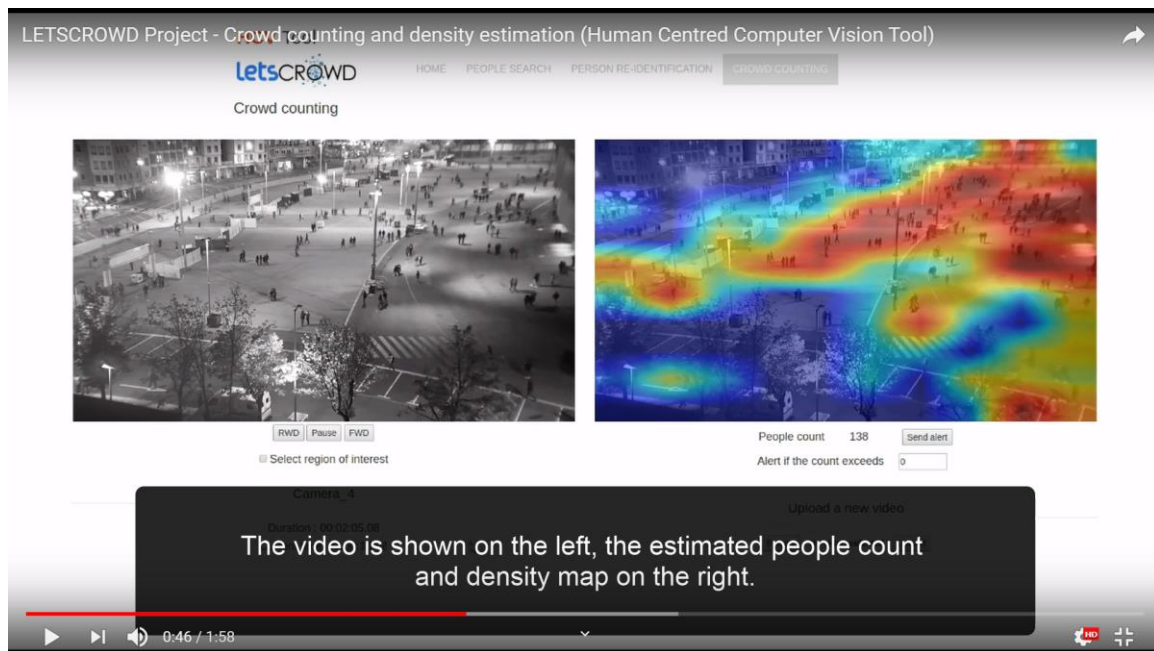
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Crowd counting and density estimation

In the LETSCROWD project a **crowd density estimation tool has been developed to provide a real-time estimate of the number of people in a scene**, or in a user-defined region of interest inside a scene. This kind of tool can also raise alerts when the estimated number of people exceeds a user-defined threshold, and when anomalous and potentially dangerous behaviours are automatically detected, such as a sudden increase or decrease of the estimated number of people.

LETSCROWD Crowd Counting and density estimation (Human Centred Computer Vision Tool) - Video



The video is available at:

<https://letscrowd.eu/hcv-crowd-counting-video>

PRA Lab works on the development of next generation pattern recognition systems for real applications such as video surveillance, biometric authentication, text categorization, and intrusion detection in computer networks. PRA mission is to address fundamental issues for the development of future pattern recognition systems, in the context of real applications.

<http://pralab.diee.unica.it/en>

PRA Lab - University of Cagliari



Dynamic Risk Assessment – DRA (Toolcard)

Carlo Dambra - ZenaByte

LETSCROWD Dynamic Risk Assessment - Toolcard

LETSCROWD tool presentation cards

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Human Factors



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Security and Protection of Crowds

LETSCROWD Dynamic Risk Assessment (DRA)

The dynamic assessment of risks is an essential element of any decision support tool aimed at improving the situational awareness while protecting mass gathering events against **High Impact Low Probability (HILP)** security risks. The proposed **DRA** approach bases its reasoning on the processing of **Weak Signals (WS)** and can be summarised in the following steps:

Collect weak signals

Analyse Weak Signals (WSs)

Generate Suspicious Patterns (SPs) from WSs

Present SPs to the operator for validation

Re-assess risks

1. **Continuously collect** the WSs potentially representing precursors of threats;
2. **Analyse** each collected WSs, and verify if, the WS alone or a **Suspicious Pattern (SP)** generated by correlating/grouping other existing WSs, can represent a more significant precursor of a threat;
3. **Present** the potential detected precursor to a security operator for evaluation;
4. **Re-assess** the risks for the considered target accordingly.

DRA processes WSs/SPs using both **fully-automatic** and **expert-driven** approaches on the basis of a **significance** value assigned to each WS/SP that takes into account the **reliability** and **credibility** of the source that generated the WS and the **time** at which it has been collected. Then, **Risk Level** can be computed using escalation approaches allowing LEAs to put in place the most suitable **mitigation** measures.

IN SHORT: Situational awareness to dynamically assess security risks

WHO IS THIS TOOL FOR?
LEA operators monitoring events and activities during mass gathering events.

WHAT IS THE ADDED VALUE OR BENEFITS FOR LEAS OPERATORS AND OTHER STAKEHOLDERS?
DRA has the following advantages over more traditional approaches:

- it searches for **out-of-the-ordinary** behaviours;
- reduces the number of false alarms;
- does not require large statistical samples and is sufficiently simple to run in **real-time**.

WHEN SHOULD THE TOOL BE USED?
DRA is effective in the **pre-event phase** in which 1) risks are evolving and can be confused due to the fact that weak signals, individually, cannot be normally identified as confirmed precursors of a given threat; 2) LEA's operator can evaluate risks without the pressure of the crowd at the event's venue evaluating possible options and evolving scenarios.




This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under the grant agreement N° 740466.

According to Industry 4.0 definitions, ZenaByte is an innovative spin-off of the DIBRIS Department of the University of Genoa whose main object is the "Development of innovative methodologies for intelligent management, interpretation and extraction of knowledge from data". ZenaByte birth is based on the research activities, consolidated in several European projects and in collaboration with major international companies, of its founding members.

<https://www.zenabyte.com>

ZenaByte S.r.l



LETSCROWD Server (Toolcard and Video)

Jordi Arias Martí - Etra I+D

LETSCROWD Server - Toolcard

LETSCROWD tool presentation cards

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LETSCROWD Server



The LETSCROWD Server presents a set of innovative tools with the aim of improving citizen security in events of massive concurrence. The results have been designed from the outset to be a direct implementation of the security model described in the European Union's Security Strategy. These are:

1. **DRA** (Dynamic Risk Assessment), dynamically assess the risk for crowd by processing weak signals and other time-varying events.
2. **PMT** (Policy Making Toolkit), to help decision makers about authorization and policies.
3. **RTE** (Real-time evacuation tool), to provide evacuation times and optimal evacuation routes.
4. **SIE** (Semantic Intelligent Engine), semantic analysis of social networks and web.
5. **HCV** (Human Computer Vision), supporting LEAs in the analysis for video footage.

IN SHORT: Event management system for LEAs to the security of crowd

VIDEO: youtu.be/byftsI7gF14

WHO IS THIS TOOL FOR?

- Public authorities: LEAs and First responders
- Event organizers: Specifically designed for mass gathering events

WHAT IS THE ADDED VALUE OR BENEFITS FOR LEAS OPERATORS AND OTHER STAKEHOLDERS?

- Provide quantified risk analysis and promote security with regards to mass gatherings events.
- Improved decision policy-makers' planning and situational awareness to help them understand and combat potential threats in crowd events.

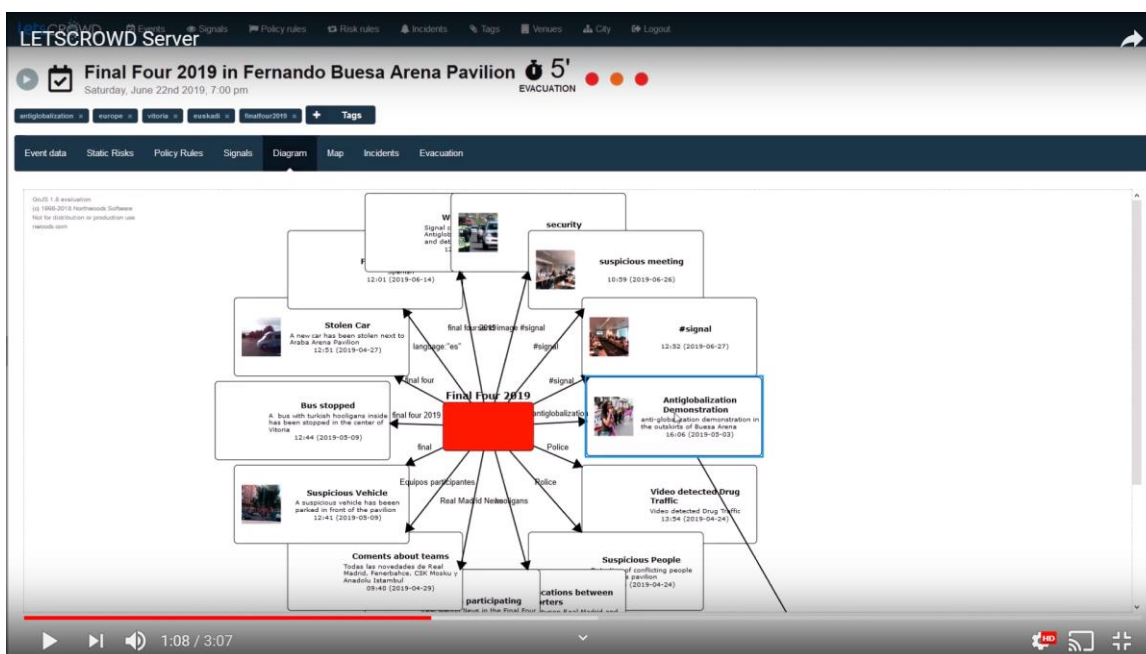
WHEN SHOULD THE TOOL BE USED?

The LETSCROWD Server is a tool designed to help LEAS control all kinds of Events in all their phases: **preparation, execution and post-event**. This centralized base will be fed by all the project tools and the intelligence coming from LEAS.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under the grant agreement N° 740466.

LETSCROWD Server - Video



The video is available at:

<https://letscrowd.eu/server-video>

ETRA is a large business group dedicated to putting at the service of society the most advanced technologies in three main activity lines: cyber-physical security, smart energy management systems, and smart mobility. In most cases it is ETRA's staff who runs the infrastructure deployed or provides guidance for our customers – the public authorities and agencies and Intelligent Infrastructure Operators.

<http://www.grupoetra.com/en>

ETRA I+D



LETSCROWD Publications

Read our publications at

<https://letscrowd.eu/peer-reviewed-scientific-papers>

- R. Delussu, L. Putzu, G. Fumera, **“An Empirical Evaluation of Crowd Counting and Density Estimation Methods in Cross-scene Scenarios”**,
submitted to VISAPP 2020, 15th International Conference on Computer Vision Theory and Applications, Valletta, Malta, February 27-29, 2020
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