



CIVIL DEFENSE TRAINING EXERCISE IN BLUMENAU, SC

It's raining heavily in Blumenau – Santa Catarina (BR), and has been for the past few days. The local river, Itajai-Açu, crossing the city from west to east, and its tributaries joining from the north, are rising by the hour, threatening to flood some *bairros* (districts) in the city center, as well as others further north.



City of Blumenau, SC, Brasil

Weather forecasts aren't good: heavy rain will keep falling for the next two days at least. In five hours the river will reach 6 meters and the first floods are expected in fifteen hours, when the river level will reach 7m.

The city's crisis cell is in talks in the town hall and, having assessed the situation in conjunction with all the agencies involved in the emergency, in accordance with existing contingency plans, decides which shelters to open and coordinates all the actions that need to be taken before the first evacuees can be accommodated. The *Defesa Civil* is responsible for opening shelters, supplying them with food, water, mattresses, blankets and hygiene kits; the city's social services mobilize psychologists to support evacuees; military police and the army protect the shelters; the highway police regulates the traffic as people evacuate the city by car; firefighters help evacuate people who have mobility issues, and rescue victims of landslides. In total, more than 15 agencies are involved.

Communications between the crisis cell and the field are very intense, but remain organized, thanks to the implementation of the SCO (*Sistema de Comando em Operações*), a variant of the Incident Management System, whose role it is to integrate in a single structure all the actors involved in the disaster response.

Having dispatched instructions to open the first shelters and start the evacuation, the crisis cell adjourns the meeting for a few hours to assess the new situation, and prepare for the next phase of the contingency plan, expected to be carried out when the river reaches 8m.

Thankfully for Blumenau's citizens this is all a simulation, executed in the town hall on April 10 and 11, 2017. The SCO was never actually deployed in the field. Instead they were in a room next to the crisis cell, where Synergy, MASA's cutting-edge constructive simulation, specifically designed for the public safety and security market was simulating the crisis scenario. In the simulation room, the members of the SCO interacted with the crisis cell via phone or radio, entered its instructions in the simulation system and retrieved all the reports required by the crisis cell to assess the situation and start a new decision making cycle.

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The idea to organize a test exercise and promote the use of constructive simulation for the preparation and training of crisis cells was first proposed by MASA during the last quarter of 2016, having met some representatives of the *Defesa Civil* of Santa Catarina state, probably the most advanced and best prepared civil defense organization in the entire Brazilian federation.

Santa Catarina decided to set the exercise scenario in Blumenau, primarily because of their excellent civil defense preparation standards, but also because of their recurrent history of floods – more than 80 in the last 115 years.



Blumenau has gone through more than 80 floods in the last 150 years.

The scenario to be simulated was based on the flooding of the Itajai-Açu river and its tributaries, as per the city contingency plan: with the water level rising, the crisis-cell must organize the evacuation of people affected by the disaster, requiring the opening, securing and resupplying of shelters for those in need. Once the water levels start to fall, special

sanitation and cleaning teams are deployed to restore street conditions and allow people to go back to their homes. Smaller scale crises, such as landslides, rescue missions, road accidents causing the spillage of dangerous products, and public order issues, were added to the main scenario to put further pressure on the crisis cell and the resources of all agencies. The scenario was set to last 6 simulated days, but a faster version of two days, with the river level rising 40 cm/h, was considered to increase the difficulty of the exercise.



Meeting in the simulation room before exercise

Preparation for the exercise began with the collection of all data required to create the scenario: cartographic and topographic information, disaster data – the extent and evolution of the flooding - contingency plans and all information related to the actors and agencies participating in the disaster response - organizations, personnel, vehicles and equipment, missions.

Thanks to the flexibility of MASA Synergy's Terrain Generation Tool, cartographic, topographic and disaster data provided by Blumenau's *Defesa Civil* were easily imported, without requiring any conversion and without any loss of data. As a result, the map shown by the system was exactly the same as the one printed and made available to the crisis cell, making it easier for the operators to become familiar with Synergy. The disaster scenario was finalized by MASA's team in Blumenau the week before the exercise was scheduled to begin – preparation was completed on April 7, with a test run of the exercise, allowing the participants to become familiar with the system and the mechanics of the exercise, and allowing MASA engineers to collect information required to fine-tune the system, check the scenario and its dynamics – i.e. how to compress six days of simulated time into nine hours of exercise time without compromising the realism of the simulation.

The scenario was played twice, on Monday, April 10 and Tuesday 11, with some variations in the dynamics. The choice to play the scenario twice and not just once over the two days was due to three reasons: crisis cell exercises normally last just one day, so that participants avoid taking too much time out from their day-to-day work; accelerating the cadence of the exercise to keep people interested and avoid idle time is clearly advantageous; having a second chance in case some improvements are required after the first run also represents a benefit.



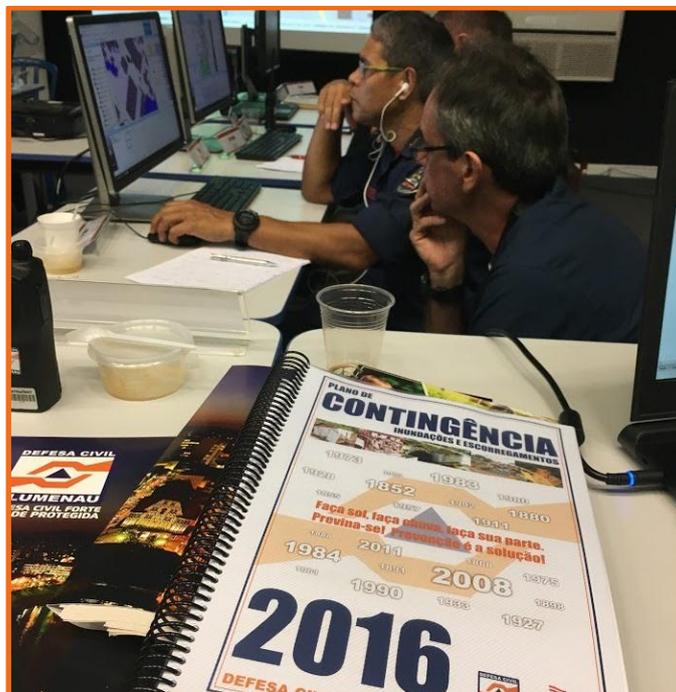
The crisis cell at work

To keep the exercise as realistic as possible, the crisis cell does not use the simulation system, as it would not be available during an actual crisis: to assess the situation and communicate its decisions, the crisis cell uses cell phones, radios, and instant messaging. All messages are directed to the SCO members in the simulation room: orders are entered in the simulation system and the resulting reports – river level, available vehicles, the number of evacuees, etc. - are sent back to the crisis cell for a new situation assessment and a repeat of the decision-making process. If problems arise, the exercise director can help the crisis cell to assess the situation by projecting the simulation screen in the crisis room and providing a clear picture of the extent of the flooding, and the location and availability of all resources. To play a six day scenario in nine hours without compromising realism, the simulation was running in real-time only during the decision-making phases; after orders and instructions were issued to the simulated units, time was accelerated to speed up execution; time jumps were performed to avoid downtime.



Simulation room - Civil Protection officials discussing before opening the shelters

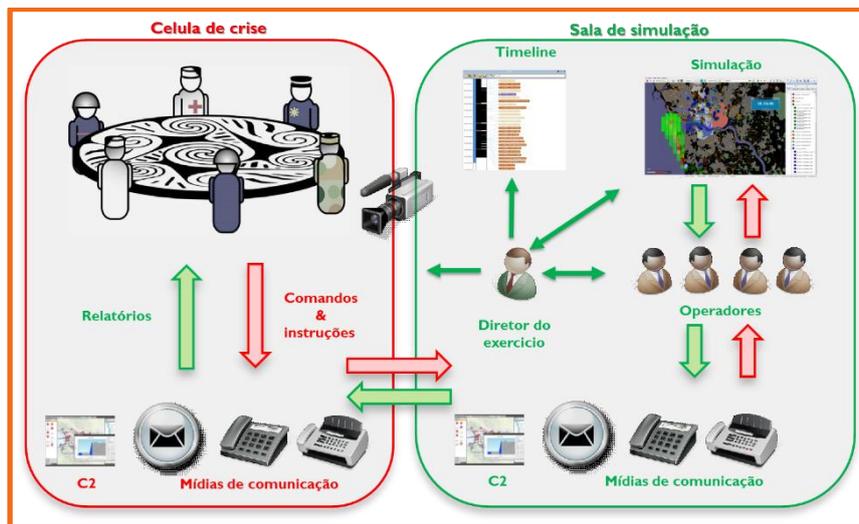
Each day ended with a hot wash-up meeting, with crisis-cell members, operators and observers discussing the exercise and suggesting improvements. On Wednesday morning, April 12, a longer, general exercise review was organized to summarize the results of this exercise.



*Simulation room -
The crisis didn't stop for lunch: plastic cups and food packages side by side with the contingency plan*

As stated by the academics attending the exercise as observers, MASA Synergy has proved to be an efficient pedagogic and analysis tool that helps to better prepare public safety decision makers.

The opinion of the academics has been confirmed by the military personnel present at the exercise: the Brazilian Army has been using the same technology, renamed COMBATER, for four years, to simulate military scenarios and train brigade and division decision makers.

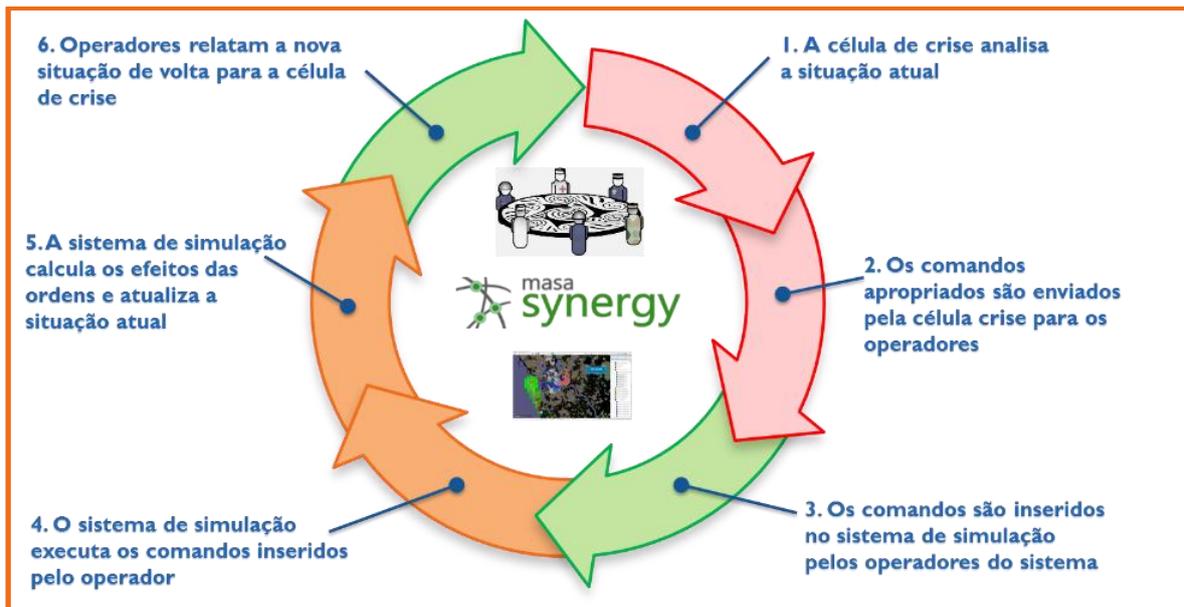


Public safety exercise execution scheme

MASA Synergy resolves the most common issues that occur during table top exercises, live and virtual simulations:

- Scenario representation. MASA Synergy effectively represents complex crisis scenarios and the consequences of decisions for the environment, the disaster, the population and the actors involved in the scenario.
- Impartiality. MASA Synergy's physical models and AI driven unit behaviors create a realistic and objective environment, responding to the laws of physics, time and the operational doctrine of each simulated unit. Simulation results are less likely to be questioned than in a live or table top exercise.
- Time management. MASA Synergy can accelerate time and perform time jumps, enabling it to simulate long, drawn out crises in a short time, without compromising the realism of the scenario.
- Costs and effectiveness. MASA Synergy more effectively trains a crisis cell than a live simulation and a table top exercise; in addition, it's more flexible and much cheaper than a live exercise.

MASA Synergy cannot replace virtual and live simulation, but it can help to optimize their use and results by connecting with them and creating a more realistic environment. Realism and immersion can be further improved by integrating MASA Synergy with the upcoming *Defesa Civil's* command and control system.



Public safety exercise workflow

For more informations :

<http://www.blumenau.sc.gov.br/secretarias/secretaria-de-defesa-do-cidadao/sedeci/defesa-civil-realiza-simulado-de-inundacao-na-proxima-semana8>

<http://www.blumenau.sc.gov.br/governo/secretaria-de-defesa-do-cidadao/sedeci/defesa-civil-realiza-simulado-inedito-de-inundacao76>

<https://www.youtube.com/watch?v=hSOUpCEJvWA>

<http://g1.globo.com/sc/santa-catarina/jornal-do-almoco/videos/t/edicoes/v/defesa-civil-realiza-simulado-de-inundacao-para-testar-programa-de-crise-em-blumenau/5790164/>

<https://www.youtube.com/watch?v=9DVk4bJe84A>



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