How Would You Like to Use Unmanned Aerial Vehicles?

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UAV copters provide a platform for a variety of sensors dependent on the end users solution requirements, (UAS). Flight time depends on payload weight, temperature and altitude .

Topics

- **UAV/UAS/Drones**
- **Federal/State/County/Local Regulations,**
- **imagery compression,**
  Genie Hays: From Sensor to Solution

- **Privacy Consideration**
- **Your Interest**

UAV/UAS/DRONES

Unmanned Aerial Vehicles
 <u>without a human pilot</u> on board.
 Its flight is controlled either autonomously by
 computers in the vehicle, or under the remote
 control of a pilot on the ground or in another vehicle.
 Wikipedia

Unmanned Aerial Systems

 remotely piloted vehicle, remotely piloted aircraft ,
 or *remotely operated aircraft.*   With a combination of
 some or all of the following: sensors, waypoint
 navigation, georectification, image processing, ..
 Jeff Young –LizardTech (as a self declared unqualified source)

Types of UAV/UAS (not this)

Education Needed to Avoid Restrictions

Two Types of UAV/UAS Platforms

- **Copters**

- **Fixed Wing**

Regulations - Rules

- **Recreational or Sport Use**

   Flown in the National Airspace System, solely for recreation and sport purposes. These are **flown under voluntary safety standards** of the Academy of Model Aeronautics US National Aero Modeling Organization.   **(Under 400 feet and line of sight)**

- **Non-Recreation Use**

   To operate a UA for non-recreational purposes in the United States, users must obtain a Certificate of Authorization (COA). Currently most require requires a public entity as a sponsor and a certified pilot.

- **Experimental**

   Limited locations currently approved

   Educational Entities

Federal Aviation Administration works on regulations that will allow the use of drones or unmanned aerial systems for commercial applications. While research and development is ongoing, other countries stand to make a leap ahead where there are fewer regulations, despite the fact that much of the technology development has come about thanks to heavy use of these technologies by the American military.

There are a burgeoning number of aerial drone platforms, including a very active do-it-yourself community. The machines are becoming more robust, with abilities to accommodate heavier payloads for longer flight times. There are also new sensors and systems that are being tailored for specific applications, taking away technical barriers by automating both the flight and data processing, and returning intelligence that can be acted upon.

UAV provide a paradigm shift for remote sensing, given their portability, low cost of operation, ease of use, and the automation of the analysis. There are legislative efforts that could dramatically impact their utility

UAV Training Be Aware

- **Typically it is recommended that organizations purchase a training copter before using one for Aerial Photography or real time event response**

- **UAV pilot flight certification classes currently cost from $2,000 to $3,500 – but what do you get??**

- **Training on a variety of associated itmes such as: Image processing or Waypoints**

Privacy Considerations

1. **Agriculture** - AUVSI "agricultural use of drones could comprise 80% of the market"---- monitor crops to improve management and yield, frequent/inexpensive Near-infrared sensors can be tuned to detect crop health—fertilizer/insecticide/water

2. **Mines** - site conditions, inspect pit walls, calculate quantities, measure/map in 3D

3. **Construction Sites** - monitoring all phases provides a check on projects with as-builts compared to plans, as well as the better coordination of materials on the job site.

4. **Infrastructure Inspection** - From pipelines to powerlines, to towers, to processing plants. The ability to sense in three dimensions, take thermal readings, and to detect metal strain will greatly improve infrastructure inspection.

5. **Wildlife Research** - monitor and track wildlife, providing new insight as well as protection from poachers. Ability to operate at night, and with thermal camera sensors, drones provide unprecedented protection.

6. **Prospecting** - Mineral and oil and gas exploration. Magnetometers detect ferrous metals and gravitational fields

7. **Storm Tracking/Forecasting** - Sending drones into hurricanes and tornadoes

8. **Emergency Response** - After a natural or manmade disaster

9. **Environmental Monitoring** - Fill a gap between manned aerial inspections and traditional fieldwork and for hard to reach areas or contaminated area.

10. **Search and Rescue** - Thermal sensors (FLIR), particularly useful at night or in challenging terrain. a powerful tool because of the ease of deployment.

How Would You Use a UAV/UAS

- **Events**
  - **Real time monitoring of a location**
  - **Response**
- **Aerial Photography and Mapping**
  - **Usually for small areas**
  - **Can provide high resolution imagery**
  - **Sensors for mapping (thermal, hazardous materials, etc.)**

Copters for Events

- **Can carry video cameras**
- **Provide GPS locations**
- **Real-time video to:**
  - **Tablets**
  - **Phones**
  - **Computers**
- **Using a remote control you can manually capture situational awareness or use preplanned flight plans and/or waypoints or determine your areas of interest and plan your flights and capture.**

Aerial Photography Examples
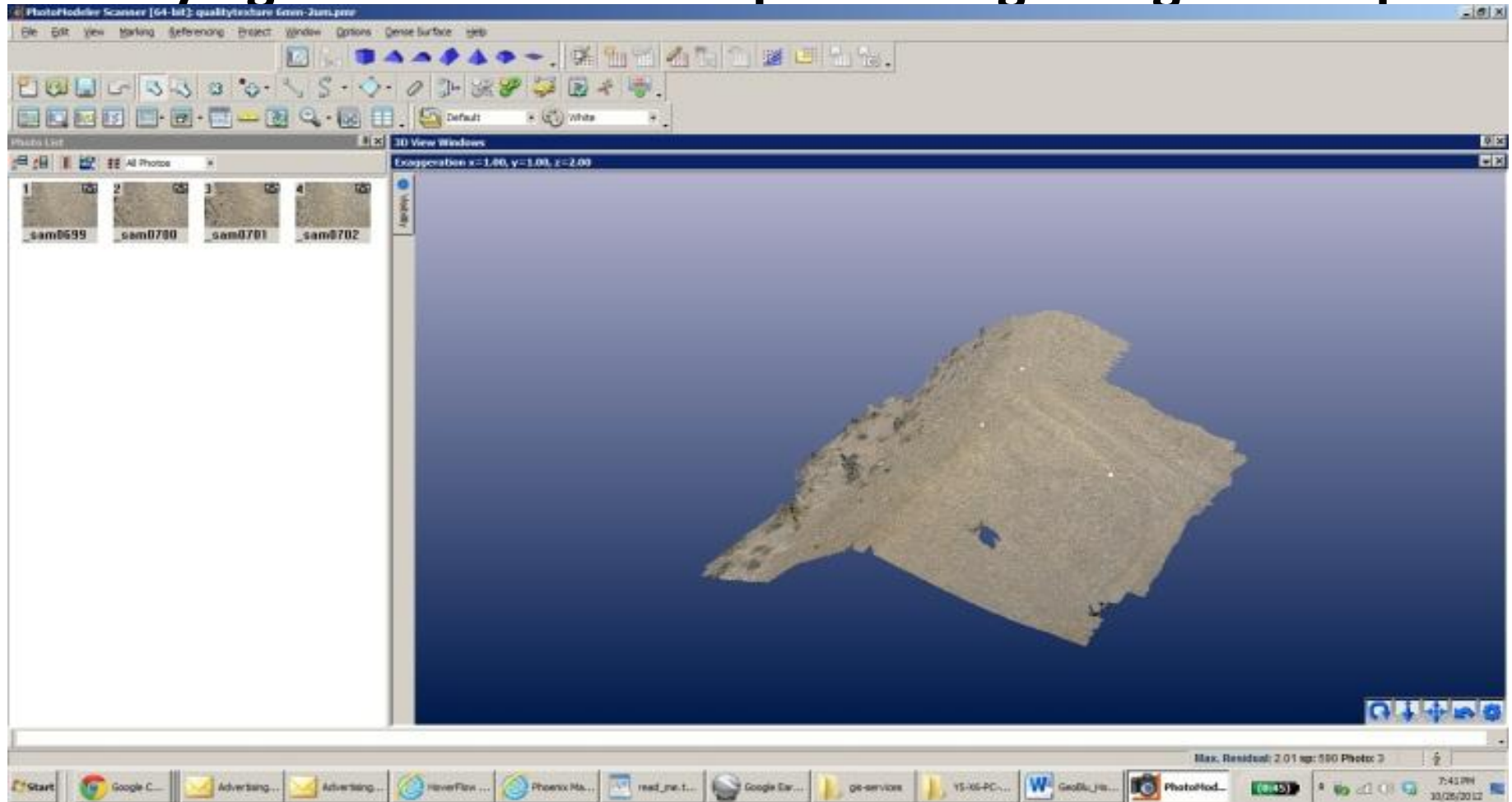
Typical Aerial Photograph

Oblique Photograph

Aerial Photography Maricopa County Flood Control Example

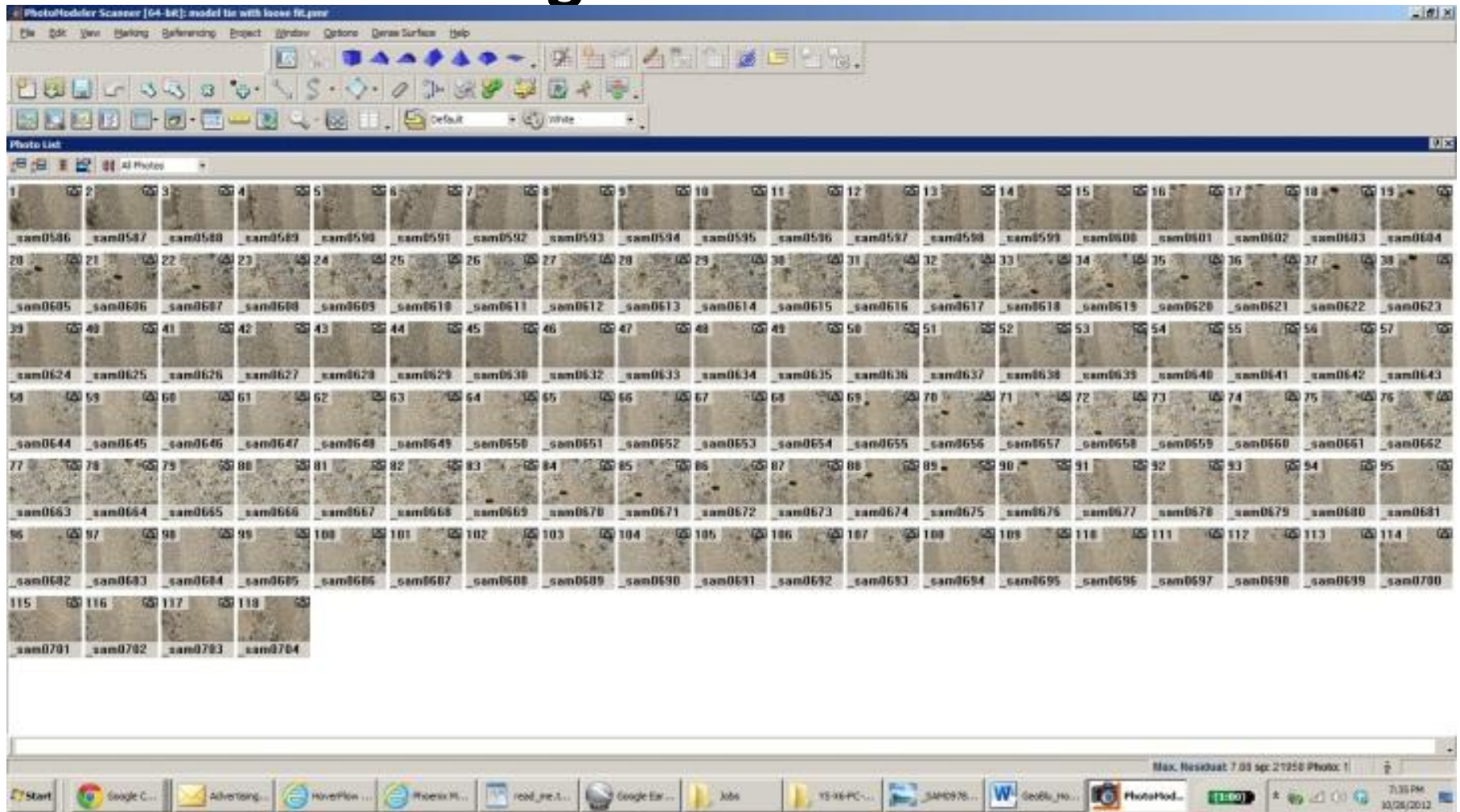- **Surface Modeling provided 6mm vertical accuracy flying at 100 feet in 25mph winds gusting to 35mph.**

Mission Planning Example
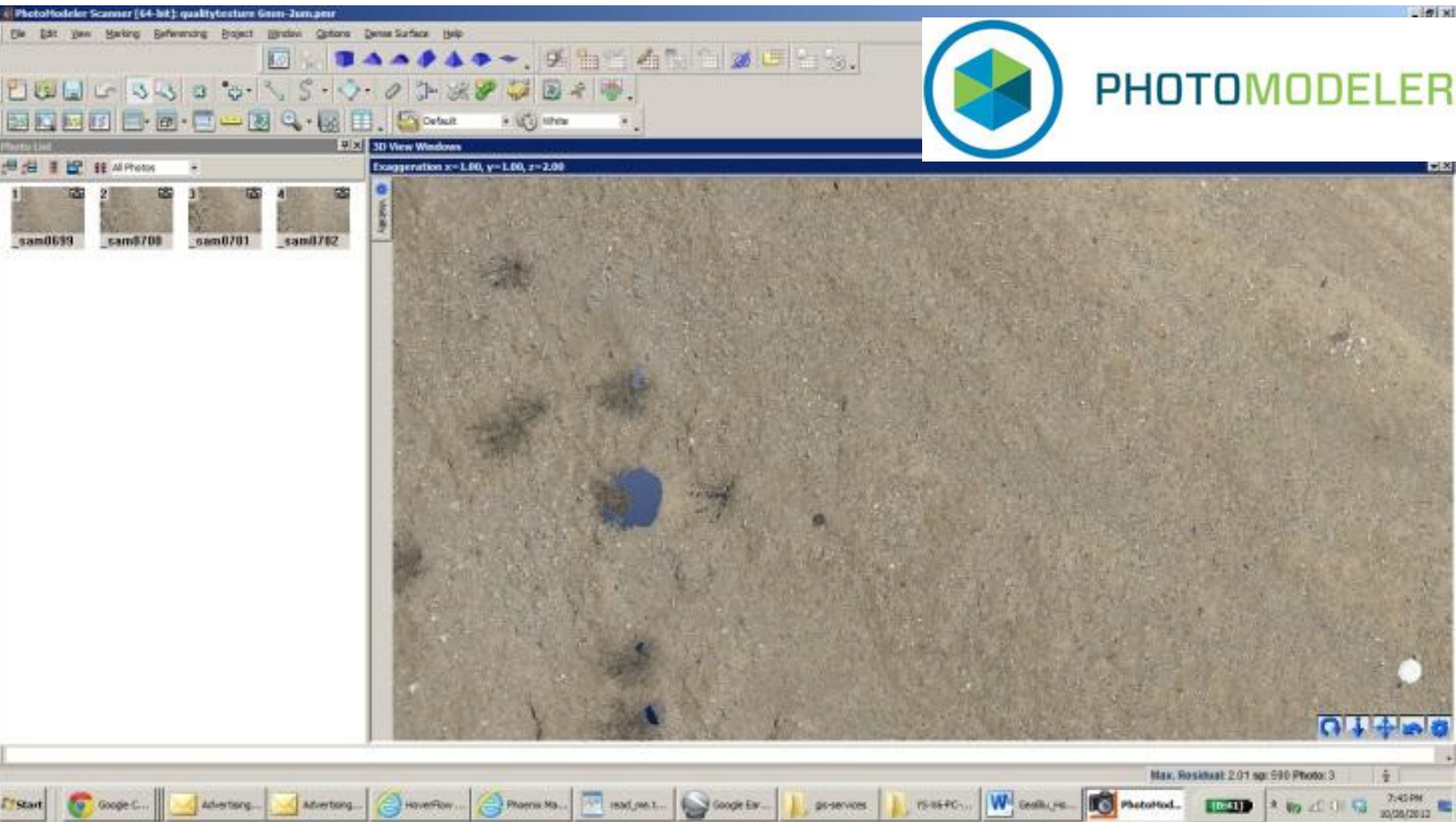
- **Copters auto-compensates for wind**

Aerial Photography

- **Post Processing**

Detail Surface Modeling

Mobile Copter Pack Custom Designed for AZ Counter Terrorism Information Center

- **Transmitter**
- **Antennae**
- **Batteries**
- **Goggles**
- **Remote Control**
- **Backpack**

Historic Preservation
Site Reconnaissance – Superior AZ

Examples of Components for a Quad Copter

- Complete Set Up - Bench/Flight Tested and Tuned
- GPS, Return Home, Intelligent Orientation Control
- Flight Controller
- GoPro Hero 3 Black Edition - 16GB Class10 MicroSD Card
- Brushless Motor Stabilized Camera Gimbal for GoPro
- Pelican Travel Case
- Extra Flight Batteries
- Battery Charger
- Live View Goggles
- Video transmitter
- Battery Level Checker
- extra props
- Flight Training – Pre/Post Flight Training

GeoBlu Surveyor 800 package

8 Rotor Frame Configuration - 800mm

WooKong Flight Controller

GPS Navigation

Point-of-Interest Flight

50 Waypolnt Mission Autonomous Navigation

6 Flight Batteries

$6799.00

GeoBlu Surveyor 550 package

4 Rotor Frame Configuration - 550mm

Naza-M '12 Flight Controller

GPS Navigation

Course/Heading Lock

16 Waypolnt Mission - Autonomous Navigation

3 Flight Batteries

$4799.00

Return-la-Home – Failsafe

iPad Mini w/Ground Station App preloaded/conflgured

Graupner MZ-18; 9 channel TXJRX

Stabilized Camera Gimbal - providing "motion-free" Imagery

7" LCD Monitor with mount – offerlng "Thru the Lens Viewing"

Remote Shutter Trigger Control

"First Person View" Camera

AC/DC Battery Charger! Battery Checker

Pelican Transport Case with Foam Insert

Bench Flight Tested

Questions and Discussion on Uses

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