



Home made explosives (HMEs) and recipes characterisation – Capability Project Overview

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HOMER Project

	Duration: 36 Months		Partners: 10
	Start/ End Dates: 1 st Nov 2013 – 31 st Oct 2016		Work Packages: 7

- The purpose of HOMER is to expand the knowledge of European bodies about Home Made Explosives (HMEs) to increase the security of the European citizen and support Europe's current and future security needs.
- The goal of the HOMER project is to implement a study to mitigate the threat of homemade explosives from the criminal and terrorist element. This will be achieved by the development of researched HME knowledge made available, through innovative, secure and usable means, for the use of law enforcement agencies, security and the manufacturers of products that can be used as precursors.



HOMER Project: Primary Tasks

- Development of a HME Data Structure (**WP2**)
- Empirical study on Web content with HME information; Development of discovery, retrieval and analysis tools for HME-related Web, multimedia and social media content (**WP3**)
- Analysis of HME recipes discovered and identified for validity of information, volatility, ease of manufacture (**WP4**)
- Development of a multi-user HME Knowledge Management Platform (KMP) (**WP5**)
- Testing and validation of systems including assessment of impact and measurements on human, operational and organisational processes (**WP6**)
- Development of a draft European Standard on HMEs, vocabulary and definition (**WP7**)



HOMER Project: Partners



Co-Ordinator/ End User
Police Service of Northern Ireland



Industry
Yara SA



Tamar Explosive Laboratories Limited



End Users
Guardia Civil



Bulgarian Defence Institute



TRINITY
COLLEGE
DUBLIN



Academic



Trinity College Dublin
Queens University Belfast
Centre for Research and Technology Hellas
Federal Research Institute Germany
South East European Research Centre

Project Support:

External Advisory Board – Fertilisers Europe, Centre for Applied Science & Technology, ICT Specialist
Security Review Group – UK Government Agency, Federal Ministry of the Interior Austria, ISDEFE Spain



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 312883.

Use of HMEs



Kinawley, Fermanagh, weapons haul included pipe bombs, gun and fertiliser
10:16 CDT 01/01/14 | Northern Ireland



Car bomb explosion after taxi driver forced to drive device to Northern Ireland police station

A car bomb has exploded outside a Northern Ireland police station after a taxi driver was forced to go against his conscience to drive the device there.



Have about a trip to Ballymena, County? Surprisingly, various city walls, churches in a distant city, built by Irish and other...



Damage was caused to the heavily fortified station, plus surrounding buildings including a nearby house and driveway. Photo: [Source]



Broke businessman brings chaos to Madrid after packing his car with gas canisters and fertilizer and smashing it into the HQ of the country's ruling party over austerity

- Daniel Perez Berlanga, 37, said he 'lost everything' due to austerity policies
- Wanted his car was full of explosives 'timed to go off within 45 minutes'
- Robot was used to examine smashed Citroen Xantia in foyer of the building
- Spain has second-highest unemployment in Europe, with 5.6 million jobless

By NIKHIL GARGUJA FOR MAILONLINE
PUBLISHED: 11:36, 10 December 2011 | UPDATED: 17:26, 11 December 2011



Oslo: Bomb blast near Norway prime minister's office

10:22 AM 2011 | Europe





New Challenges for LEAs

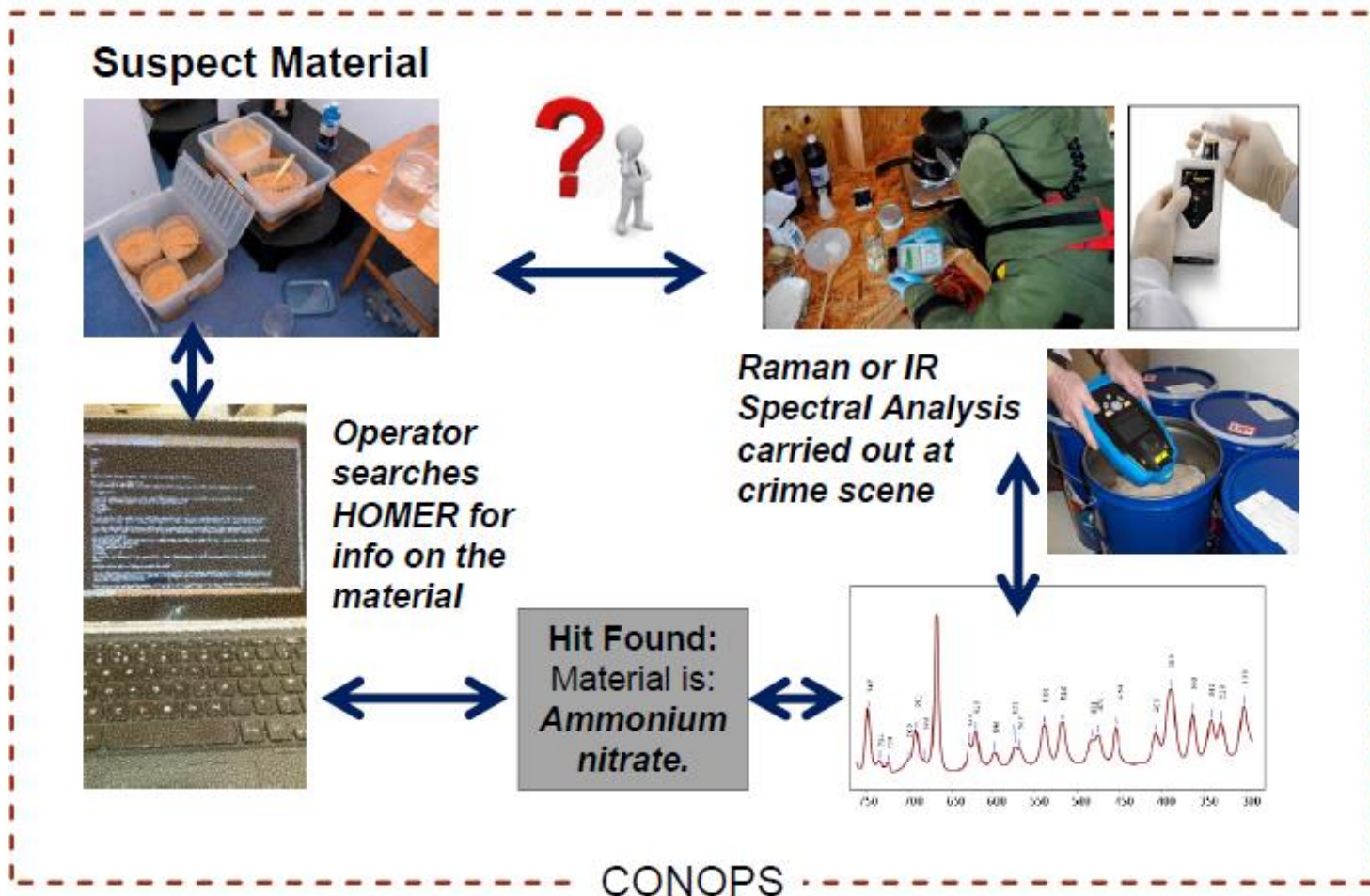
- Extensive use of the Web and Social Media/Multimedia Platforms for diffusing knowledge related to terrorism and the construction of IEDs and HMEs



- Construction of HMEs by using everyday household goods



Identification of HMEs using HOMER





Support LEAs via HME Discovery Tools

- Provide a suite of tools for discovering, retrieving and analyzing HME-related content on the Surface/Dark Web
 - Web pages
 - Blogs
 - Forums
 - Multimedia posts
 - Social media posts
- Support LEAs based on the user needs
 - Gather intelligence using interactive tools
 - Filter the most significant resources




HME Discovery Tools/Web Searching

- Exploit existing search engines for discovering HME Web resources by running keyword-based searches
 - Select the search engine(s) of preference from Surface/Dark Web (e.g. Bing, Yahoo!, DuckDuckGo, Torch)
 - Use the provided HME-related patterns/expansion rules for the automatic submission of HME queries aiming at returning HME resources in the top results
 - Re-rank the discovered results based on their relevance to the HME domain



DuckDuckGo



 HOMER Discovery Tools

Concept Detection Social Media Analysis

Free Text Search Explosives Ingredients

Yahoo! x

Search..

Search History

HME discovery

Upload

FULMINATE COMPOUNDS - unito.it 0.98

http://lem.ch.unito.it/didattica/infochimica/2008_Esplosivi/Fulminate.html

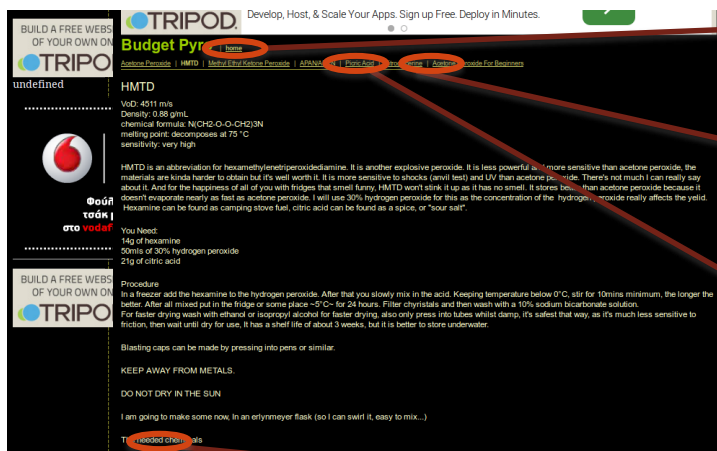
Mercury(II) fulminate is highly sensitive to friction and shock and sparks. It is mainly used as a trigger for other explosives in percussion caps and blasting caps ...





HME Discovery Tools/Web Crawling

- A Web crawler exploits the graph structure of the Web for the discovery of HME Web resources
- **Focused Web Crawler:** Selects which hyperlinks to follow by estimating their relevance to the HME domain based on local evidence on parent page (e.g. text around a hyperlink, anchor text)



` Home `

` Picric acid `

` Nitroglycerine `

Check out my web site on my other hobby:
` motorcycles `



HME Discovery Tools/Web crawling

- Provide the seed pages (i.e. starting points) of the crawl (from Surface/Dark Web, i.e. Tor, I2P, Freenet)
- Define the crawl depth (i.e. the maximum distance allowed between the seed pages and the crawled pages)
- Re-rank the discovered results based on their relevance to the HME domain

The screenshot displays the HOMER Discovery Tools interface. At the top, there is a green header bar with the text "HOMER Discovery Tools". Below this, a navigation bar shows "Concept Detection" and "Social Media Analysis". The main interface includes a "Select files..." button, an "Add urls..." input field, and a "Depth" dropdown menu set to "1". A slider control is visible, ranging from 0 to 1, with a red dot at 0.5. To the right of the slider is a checkbox labeled "Domain-Restricted Crawling" and a "Submit" button. Below the input fields, a list of URLs is shown, including "https://www.texasguntalk.com/forums/lubbock/38775-black-powder.html". At the bottom, a results box displays a link titled "Black Powder Recipes" with a green checkmark and a score of 0.94. The link is "http://www.musketeer.ch/blackpowder/recipe.html". Below the link, a snippet of text is visible: "Black Powder Recipes **** Ulrich Bretscher's Black Powder Page **** Home Black powder menu ubub The ...".



HME Discovery Tools/Multimedia Analysis

- Perform keyword-based searches on the Youtube platform
- Present the results (video preview + video metadata)
- Identify the HME-related concepts (i.e. objects) present on the discovered videos (e.g. glassware, smoke, liquid)
- Display whether a video file is HME-related or not

HOMER Discovery Tools

Concept Detection Social Media Analysis

acetone peroxide

0 0.5 1

Search Upload

Title: Make acetone peroxide-high explosive

Description: This video is for educational purpose only. Take extreme caution. I'm not responsible for what you do based on this video.

Tags: Acetone Peroxide (Chemical Compound), Explosive Material (Film Subject), Acetone (Chemical Compound), Fire

Concepts Retrieved:
Outdoor: 0.612436

Make acetone peroxide-high explosive

Make acetone peroxide-high explosive

✓



HME Discovery Tools/Social Media Analysis

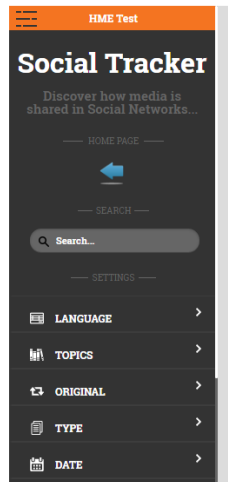
- Identify of Twitter users involved in HME recipes exchange
 - Keyword-based search on Twitter (i.e. keywords, hashtags)
 - Continuous retrieval and presentation of relevant results (user tweets)

User	Tweet Content	Date	Retweets
cbstrong68	@fpsuper blue dawn, hydrogen peroxide and baking soda works great!	13 Jul 2016	0 retweets
Pharmacy_Today	RT @magnoliarx: Cleaning Your Wound: Hydrogen Peroxide or Soap and Water? https://t.co/d1948zeafb	13 Jul 2016	1 retweets
BlameOxytocin	Hydrogen peroxide-induced oxidative damage in peripheral blood lymphocytes from rats chronically treated with... https://t.co/86yfo8jwTL	13 Jul 2016	0 retweets
magnoliarx	Cleaning Your Wound: Hydrogen Peroxide or Soap and Water? https://t.co/d1948zeafb	13 Jul 2016	1 retweets
WaterOnline	On-Site Hydrogen Peroxide Generation for Advanced Oxidation Process		
maggies31	Lots of uses for hydrogen peroxide, but this is one I		
BY_climatechange			
AllisonandMoon	@TheKatrinaSet hydrogen peroxide soak.		



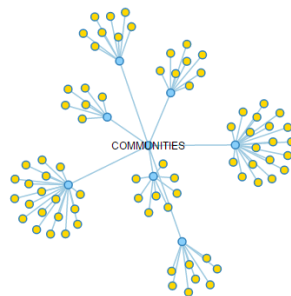
HME Discovery Tools/Social Media Analysis

- Community detection, Key player identification
- Analytics (e.g. most active users, user locations, heatmaps)

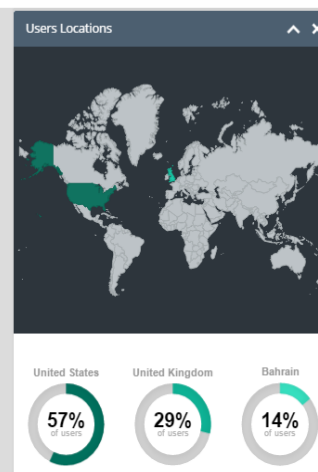
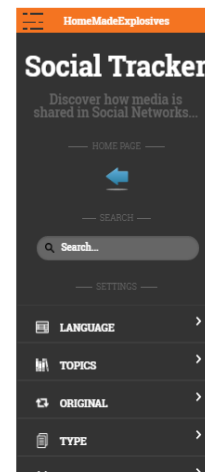


Community Detection

Communities are represented by blue bubbles. Those in yellow are the users in each community. You can visit the user Twitter profile by clicking on a user.



Social Media Analysis



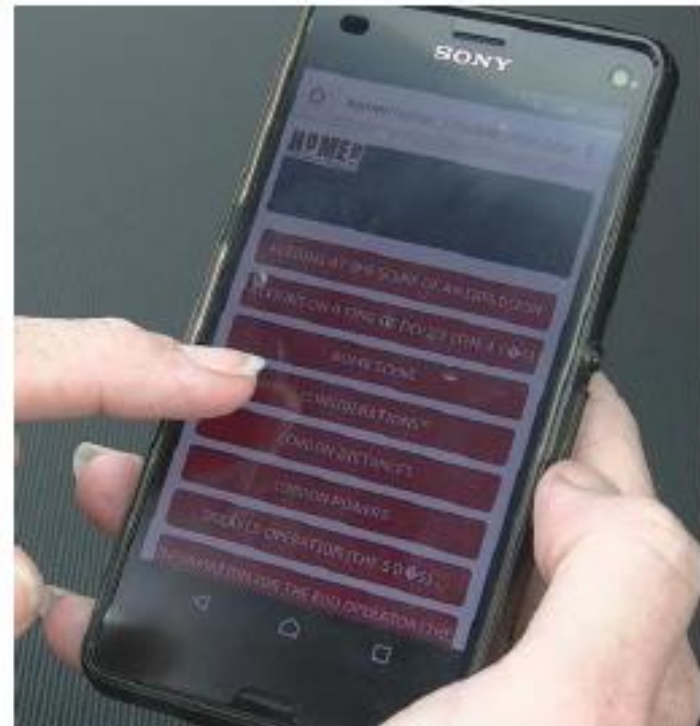


HOMER Knowledge Management Platform

Desktop/Tablet version

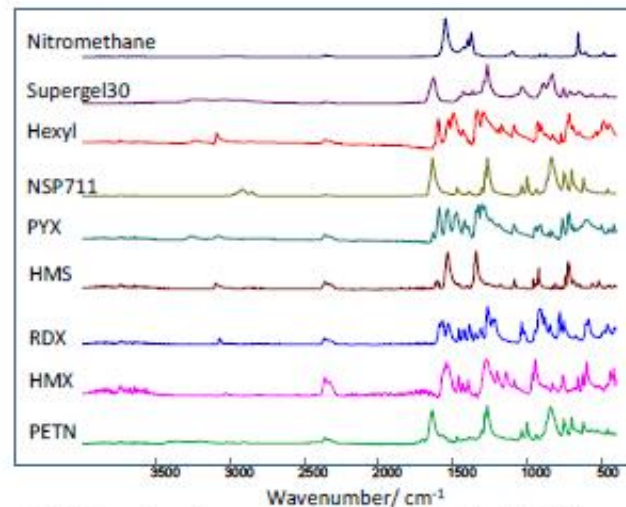


Mobile version

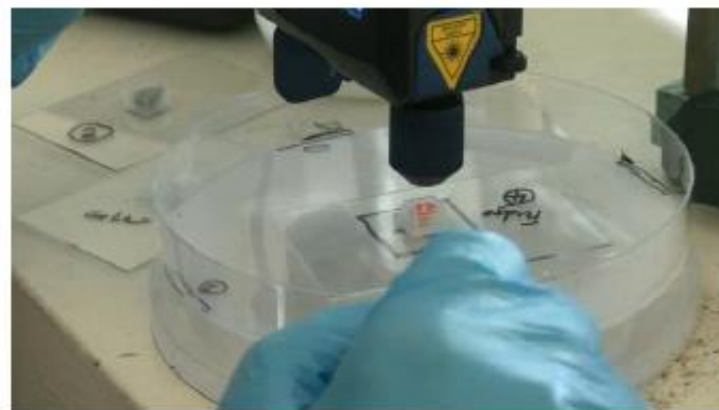




Library of Raman & IR Spectra

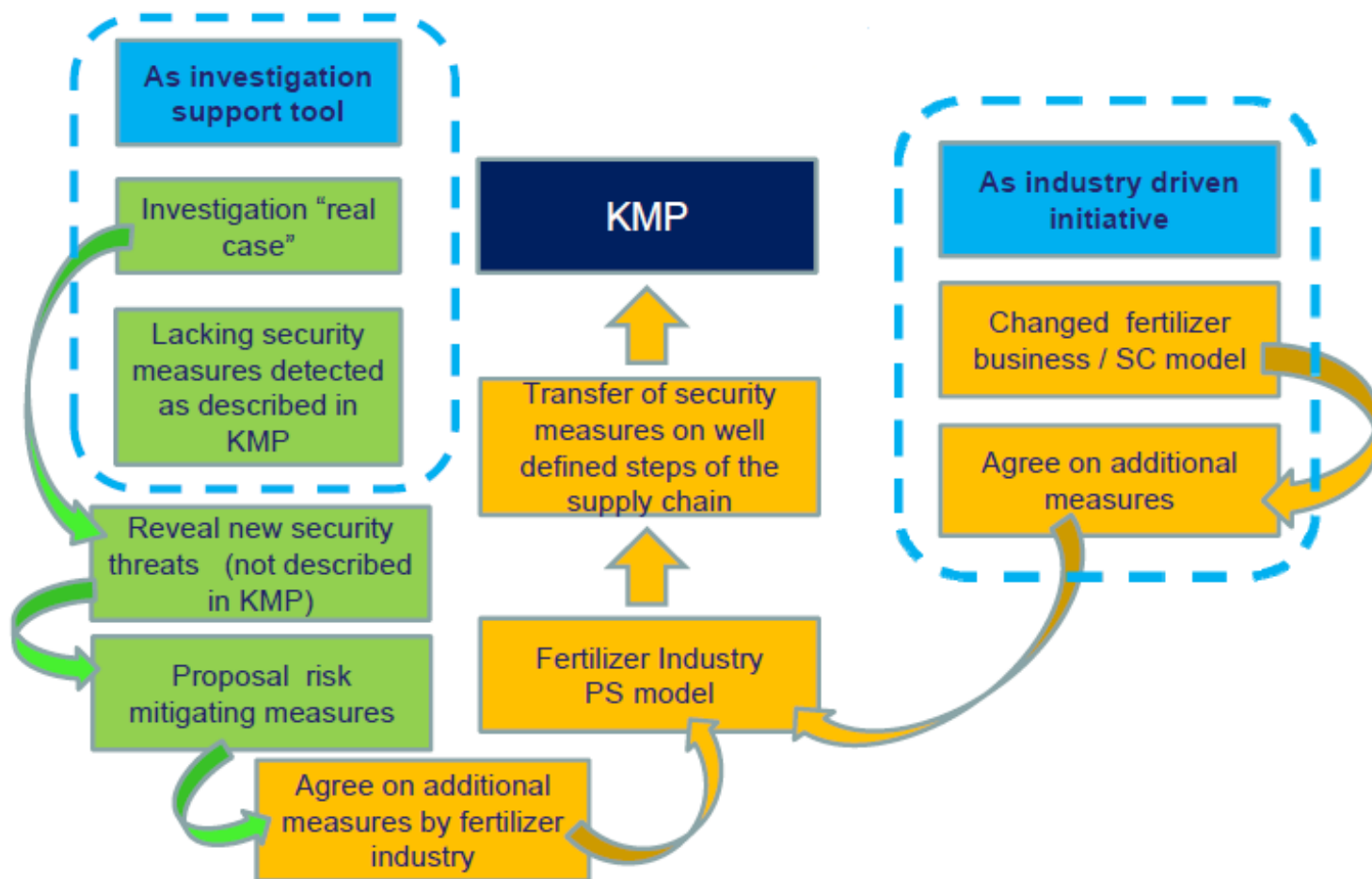


ATR-IR spectra of commercial explosives recorded at BAM





HOMER KMP & Fertiliser Supply Chain Security Model





Envisaged Impact

- Increase the security of Europe for citizens by exploiting information being transmitted on the internet to Predict and Prevent the use of HME through Attacking the Terrorist or Criminal Networks at a Strategic Level whilst Defeating the Device at a Tactical level utilising the tools developed.
- Through the development of tools work to reduce possible occurrences of events using HME by improving the capability of LEAs and Security Agencies to tackle the threat.
- Provision of sustainable solutions to continue to support and inform LEAs and Security Agencies beyond the life of the project to understand new and emerging threats.
- Improve security for the supply and distribution of fertilisers from manufacture to the field



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Thank you

For more information please visit: <http://www.homer-project.eu/>

<http://mklab.iti.gr>

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