PRIME
Preventing, Interdicting and Mitigating Extremism

FINAL PUBLISHABLE SUMMARY REPORT

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CONTENTS

GLOSSARY

Acronym	Definition
AU	Aarhus University
BN	Bayesian Network
DOW	Description of Work
HUJI	Hebrew University Jerusalem
KCL	King's College London
LAE	Lone Actor Extremist
LAEE	Lone Actor Extremist Event
RAF	Risk Analysis Framework
RAM	Risk Analysis Matrix
RAPA	Radicalisation, Attack Preparation, Attack
STD	State Transition Diagram
UCL	University College London
UoL	University of Leiden
UoW	University of Warsaw

EXECUTIVE SUMMARY

Lone Actor Extremist Events (LAEEs) are terrorist attacks carried out by individuals acting largely alone. The PRIME Project aimed to address "needle in a haystack" problem posed by LAEEs in order to produce a scientific knowledge-base which could inform the design of tools and countermeasures for the prevention of lone-actor radicalisation, the disruption of lone-actor terrorist plots, and the mitigation of terrorist attacks carried out by lone extremists.

Our first task was to deliver an analysis of the range of contextual elements which could affect the adoption and successful implementation of countermeasures, as well as an ethical research framework to ensure compliance with ethical and legal principles.

Our next major task was to produce a set of analytical and operational definitions of key terms, a review of the state of knowledge on lone actor extremist events, the articulation of the project's theoretical background, and the formulation of a Risk Analysis Framework synthesised in a Risk Analysis Matrix identifying key categories of factors to be targeted for data collection. This conceptual work was then translated into data needs and a set of data collection instruments.

A methodological framework was produced, which articulated the meta-model which would inform the design of a scripting tool. A Bayesian Network approach to scripting was developed. This work package was key in enabling the interdisciplinary goal of the project, which is one of the project's main areas of innovation, bringing together social science and engineering methods.

Operationalization of the Risk Analysis Framework's key mechanisms and causal categories was followed by extensive collection of empirical data on each phase of the lone actor extremist event (radicalisation, attack preparation, attack), including a Large-N sample of attacks in the US, Europe and Israel, and a set of in-depth case studies. A Medium-N of the most data-rich cases was used to produce subscripts for each of the event phases.

The Large-N dataset, made up of 125 cases, representing the total population of lone-actor events for which information was available to PRIME researchers for the period 1990 to 2015, was fully analysed using inferential, geospatial, state transition diagram and Bayesian networks techniques. Taken together, these analytical products combined with the risk analysis framework and the outcomes of WP5 were used to identify intervention opportunities.

This informed further activities involving legal reviews, surveys, interviews and consultation with law enforcement practitioners and community members to produce a portfolio of LAEE counter-measures requirements. In parallel, communication requirements for preventing radicalisation, interdicting attack planning and mitigating attacks carried out by lone actors were scoped and tested using three large national surveys in the UK and Denmark to produce a portfolio of communication-based countermeasures.

Throughout the project's lifetime, we carried out an array of close to 300 dissemination activities (e.g. conference presentations, papers, media publications, briefings, website, social media) to involve end-user, scientific, civil, and public audiences.

PROJECT CONTEXT AND OBJECTIVES

The 22 July 2011 bombing and mass shooting in Oslo carried out by Anders Behring Breivik was a shocking wake-up call in regards to the threat which can be posed by lone extremists. Although it is important to recognise that the majority of lone extremists fail to carry out attacks as destructive as that orchestrated by Breivik, their actions have the potential to result in significant loss of life, and to be highly damaging to local and national communities.

In a testimony before the US Congress, then-CIA Director Leon Panetta observed that so-called 'lone-wolves' now stood as the security threat which deserved the most attention from security services. While the ever-present threat of Daesh has brought the risk posed by organised terrorism back to the fore, the group's documented efforts to inspire individuals to take the initiative in acts of home-grown terrorism have kept lone actor terrorism at the forefront of law enforcement and security service's concerns. Recent tragic events, such as the attacks in Nice and Manchester, have brought recent, stark illustration of the devastation lone actors can cause. Likewise, a spate of hate- or nationalism-inspired violent incidents has raised the spectre of another surge in lone actor extremist violence and made the case anew that lone actor terrorism is not the sole apanage of Islamist-inspired terrorism.

Despite these events, Lone Actor Extremist Events (LAEEs) remain relatively rare occurrences, which is a good thing. Yet that very rarity is also what makes these terrorist events hard to detect, disrupt, and recover from. LAEEs present stakeholders with a classic "needle in a haystack" problem and confront researchers with unique challenges due to the low base-rate of these particular events.

The PRIME Project aimed to address these challenges in order to 1) improve our understanding of LAEEs generally, 2) set out the scientific foundation for the development of analytical tools, and 3) inform the design of countermeasures for the prevention of lone-actor radicalisation, the disruption of lone-actor terrorist plots, and the mitigation of terrorist attacks carried out by lone extremists.

In this endeavour, PRIME adopted **an innovative multidisciplinary approach**, which set out to:

- Produce a general (context-independent), multilevel risk analysis framework, which articulates the key factors and processes implicated in LAEEs, translating cutting-edge theories of criminal development and criminal events into a conceptual matrix which guided the project's data collection activities, in order to progress beyond atheoretical lists of (context-limited) 'risk factors' towards models that preserve information about the sequencing of LAEE indicators.

  Such a general model, unavailable at the time the project started, was needed to allow for the clear organisation of what was known about the factors and processes which give rise to these events, at multiple levels of analysis (individual, situational, social ecological, and systemic), and along the three main stages which characterise them: radicalisation, attack

preparation, and attack. Such a model would also enable the identification of "pinch points" (opportunities for intervention) at which countermeasures can be introduced.

Finally, the model would also form the basis of a risk analysis tool, in that, like a diagnostic framework, it can guide the identification and interpretation of indicators ('symptoms' or 'markers') in order to establish their meaning across changeable contexts.

- In order to arrive at such a model, collect historical data on LAEE events from multiple open and privileged sources. Organising and analysing such complex and disparate information required the development of a custom analytical strategy and the adoption of specific modelling techniques in order to develop scripts of LAEEs.

- Consolidate the process involved in the production of LAEE scripts and the formulation of countermeasures, notably, through expert and end-user involvement at several stages in the development of the project's methods and the formulation of outcomes, including a portfolio of socio-physical and communication-based countermeasures.

- Develop an analytical approach combining formal modelling techniques drawn from security engineering with expertise from the ecological, social, behavioural and criminological sciences, to take the modelling of LAEEs in particular, and the modelling of crime events in general, beyond the current state of the art.

- Characterise (i.e. define) the risk posed by lone actor extremists, in a way that promotes a clear conceptualisation of the risk, as well as reconciles the demands of analysis (scientific research) and practice (stakeholder constraints).

- Deliver analytical products which can contribute to the development of tools for LAEEs' risk analysis and management, including scripts of LAEEs based on heretofore unexploited data, some requiring privileged access, and using heretofore unexploited modelling strategies and techniques.

- Identify opportunities for intervention at which countermeasures can be introduced.

- Specify the context in which countermeasures are implemented, with particular attention to stakeholder constraints, public perceptions of the risk, and ethics issues, in order to inform the formulation and adoption of LAEE countermeasure requirements.

- Develop a design framework, and portfolio of, socio-physical and communication measures for the prevention, disruption and mitigation of LAEEs in order to set out requirements for future such countermeasures.

- Disseminate the key findings and outputs of the project to potential end-users, stakeholders, subject matter experts, and the wider public.

The present document summarises how these objectives were achieved over the project's lifetime.

DESCRIPTION OF THE MAIN S&T RESULTS/FOREGROUNDS

WP 1: Project Management

Objectives:

- Manage efficiently the financial, administrative, scientific and technical aspects of the project, in order to ensure that project's objectives and ultimate deliverables are achieved with respect to the resources and timescales set out in the DoW.

- Implement effective mechanisms to monitor the project's scientific and technical progress, including quality control and verification mechanisms.

- Ensure adherence to FP7 guidelines for project reporting, as well as efficient and prompt communication with the EC.

- Maintain up-to-date contractual documents relative to the project and all other required administrative documentation.

- Facilitate fluid, supportive and transparent communication between members of the Consortium, in order, notably, to address any problems or deviations from the work plan in a timely and effective way.

- Communicate with project stakeholders and other bodies or groups involved in cognate areas of research.

Task 1.1 Administrative management

A Consortium Agreement was negotiated, adopted and signed by all project partners. It set out in detail the responsibilities, rights, and liabilities of project partners relative to each other, in accordance with the provisions of the Grant Agreement.

To ensure the smooth and effective monitoring of the scientific progress of the project and its financial organisation, regular internal reporting exercises took place. Data was collected using a dedicated template, and subsequently analysed. The monitoring exercise was discussed during PSC meetings.

Task 1.2 Technical management

This task aimed to implement the effective management structure devised at the beginning of the PRIME project, enabling all objectives to be met and all impacts achieved, within FP7 rules and guidelines, budget and agreed timescales. The chosen management structure and procedures were intended to build upon management expertise of EC-funded projects within the consortium, and to build in efficient and consensual response mechanisms to unexpected changes or conflicts.

The Consortium was organised as follows:

- A Project Steering Committee (PSC) was the main decision-making body and overall coordination mechanism. As a consultative mechanism, it ensured smooth collaboration within the consortium.

- The Project Coordinator (PC), Dr Noémie Bouhana, was the main point of contact between the project and the external world, and who bears the main responsibility for technical coordination as the principal scientific investigator, as well as the monitoring of progress, and the eventual exploitation of the project's results.

- The Project Manager (PM) was the main point of contact between the project and the EC, and bore the main responsibility for the administrative (including financial) coordination. The PM also coordinated and communicated with each partner to ensure timely delivery of the managerial and technical reports to the EC. The role was filled by staff from the the UCL European Research and Innovation Office.

- Work Package Leaders (WPL) were responsible for the scientific management of their WP, including timely delivery of respective deliverables.

- The Independent Ethics Advisor (IEA) advised and monitored that all ethical issues linked in with the development of the project were promptly addressed. The role of IEA was held by Prof Manuel Eisner, Professor of Comparative and Developmental Criminology at Cambridge University.

- The End-User Engagement Advisor (EUEA) advised the PSC and the Dissemination Coordinator to ensure effective dissemination of the project's outputs, in order to maximise adoption. The role of EUEA was held by Chris Phillips, formerly director of the National Counter-Terrorism Office (NaCTSO), now managing director at the International Prepare and Protect Security Office.

- The Dissemination Coordinator (DC) was dedicated to dissemination, knowledge-transfer and exploitation activities stemming out of the project. The role of DC has been undertaken by Vaseem Khan, Business Development Manager at the Department of Security and Crime Science, UCL.

- In addition, the PSC was able to take advice from the project's Expert Advisory Board (EAB). Experts were selected with input from all partners, to ensure contributions from number of countries, professional backgrounds, and sectors of activity. The purpose of this body was to provide strategic, but also practical, guidance to the PSC. 7 individuals co-opted agreed to serve in the PRIME advisory board, from the UK, Netherlands, Israel and USA.
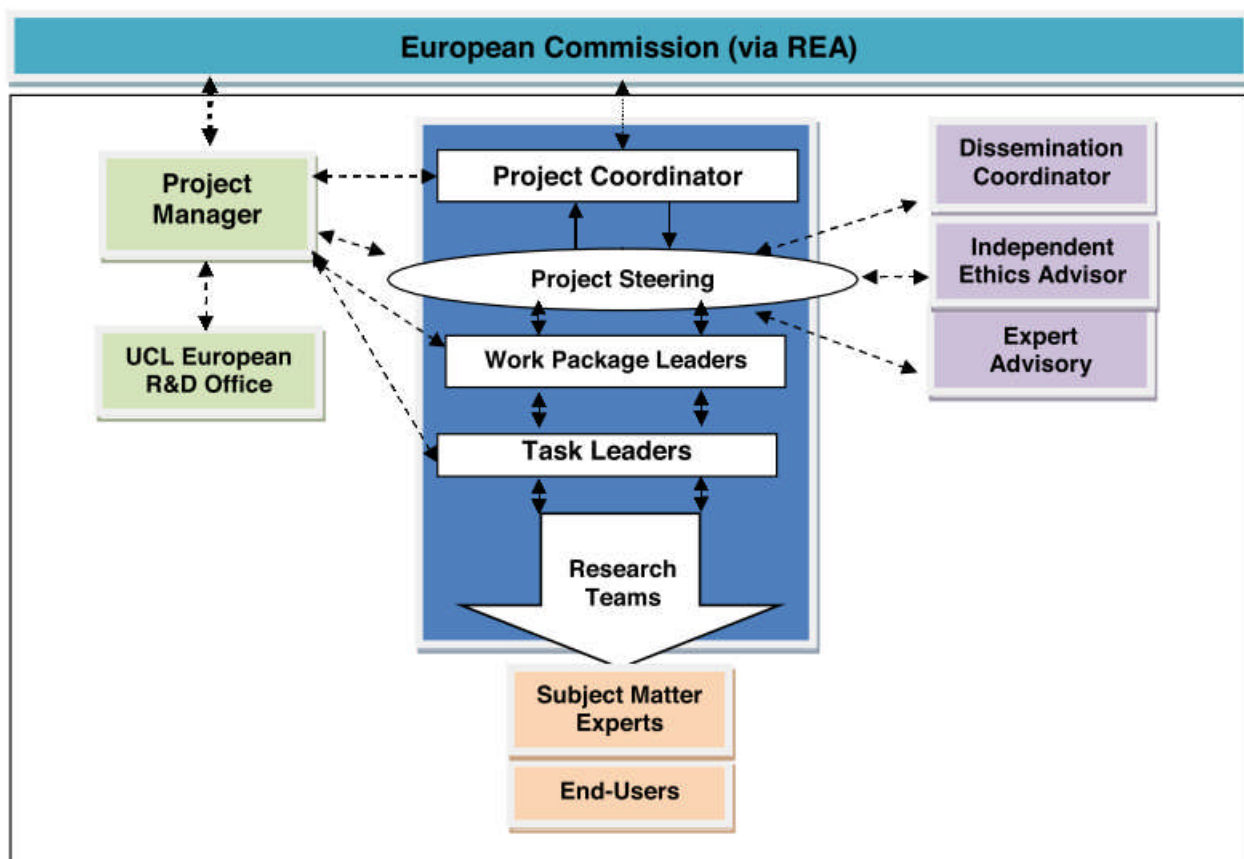
PRIME Consortium Management Structure

Task 1.3 External coordination

This task ensured that the Consortium remained aware of similar or complementary research taking place in the problem domain of lone actor terrorism specifically and terrorism and radicalisation more generally; create, if appropriate, scientific synergies with academic partners; and promotes the aims and outcomes of the project with regards to key stakeholders.

Examples of external coordination activities include:

- Attending a meeting at the Royal United Services Institute (RUSI) to discuss possible synergies between PRIME and the CLAT project (Countering Lone Actor Terrorism) in November 2014. One of the PRIME collaborators was invited to sit on the CLAT Expert Advisory Board.

- Making contact with the coordinators of Project THREAT, funded under the Prevention, Preparedness and Consequence Management of Terrorism and other Security-related Risks (CIPS) programme, which looks at the risks and vulnerabilities of a hospital in the case of it being the direct target of a terrorist attack and ways to mitigate these, to discuss possible synergies with PRIME.

- Contribution of an entry to the FP7 Security Research Catalogue 2014.

- Providing private briefings and presentations on PRIME to key stakeholder organisations (e.g. UK Cabinet Office, UK Home Office, Office of Security and Counter-Terrorism; invited presentations: NATO Intelligence Fusion Centre 2014 Conference; Radicalization and Violent Extremism Washington, DC 2015 conference organised US National Institute of Justice, UK Home Office and Safety Canada).

- Attendance at networking events attended by stakeholders and researchers in the problem domain (e.g. Ambascience Networking Event organised by the Chercheurs and Ingénieurs Français au Royaume-Uni (CIFRU), French Embassy, London, November 2014; US Minerva Initiative Annual Conference, Washington, DC, September 2015; CT Expo, London, April 2015, April 2016, May 2017).

WP 2: Context Analysis

Objectives:

Work Package WP2 (Context Analysis) principally comprised all activities involved in the elicitation, analysis and specification of contextual factors, which could affect the design, adoption, and implementation of prevention, interdiction and mitigation measures to defend against lone actor extremist events (LAEEs) in a European context. WP2 also produced the ethical framework (i.e. principles and procedures), which framed the research and dissemination activities of the project throughout its lifetime.

The overall objectives of the Work Package WP2 were the following:

- To collect data in order to deliver an analysis of contextual factors which could affect the overall aims of the project in a number of European countries.

- To ensure that real-world constraints and contextual information are integrated into the project's activities and outputs.

- To verify that the elicitation and synthesis of contextual factors carried out in the first period informed the activities of WP7 and WP8.

- To ensure that all activities associated with the project were conducted within ethical guidelines and procedures by providing an ethical framework and associated procedures and monitoring processes.

- To report on the efforts implemented by the partners to adhere to the ethical framework and address the requirements of the ethics audit carried out at the project's midterm.

Task 2.1: Identification of Contextual Elements

This task delivered a list of topics and problems, which needed to be addressed during the execution of research devoted to the production of a Context Analysis Report. In consultation with

partners, and through early engagement activities with end-users and subject matter experts (SMEs), a set of topics and questions were identified (i.e. cultural, legal, operational nature) that could affect the validity, reliability and impact of the project's activities. International and national legislations were identified for further analysis. Information sources (literature, open source data) were selected, which would inform the socio-cultural element of the analysis. A list of law-enforcement agencies and security (i.e. intelligence) services was established, who should be approached for the purpose of research. UCL organised a workshop which engaged with practitioners from a number of UK and which elicited both information on the practitioners' awareness of the state of knowledge on lone actor terrorism and existing counter-measures, as well as the constraints, which they personally faced when working to prevent, detect and mitigate LAEEs.

Once a list of key contextual factor categories was identified, research activities were planned, in order to collect data on each category of topics and better understand their relevance in the context of defending against LAEEs. This work directly set the stage for the research carried out in Task 2.3 to refine and specify contextual factors and their impact on the implementation of countermeasures against LAEEs.

Task 2.2: Specification of Ethical Research Framework

The purpose of this task and all associated deliverables was to ensure that the PRIME project's research and dissemination activities were carried out with respect to institutional, national and European ethical guidelines and regulations. To this end, each project partner was required to familiarise themselves with procedures and legislations relevant to the planned research activity and to related issues, such as data storage and anonymisation, and to apply for appropriate approval from their institutions, within the guidelines set by the relevant national and international framework. This task benefited from the contribution and oversight of the project's Independent Ethics Advisor (IEA).

Specific achievements for this task are as follows:

- Prof Manuel Eisner (University of Cambridge) was appointed as the PRIME project's IEA and contributed his advice to the production of the deliverables related to this task, notably the Ethical Research Framework. Prof Eisner also conducted a midterm review of ethical issues on the occasion of the Project Steering Committee meeting held in Warsaw at the project's mid-term, which concluded that the PRIME partners had carried out their work in conformity with the principles and procedures set out in the project's Ethical Research Framework (ERF). A final review was also conducted at the last Project Steering Committee meeting held in London in April 2017. On each occasion, an ethics report was delivered.

- Ethical research approvals were obtained from the appropriate institutional ethics boards and committees in conformity with local and national guidelines.

- An Ethical Research Framework was agreed by the partners which set out:
    - the role of the IEA;

- the nature of the relationship between the IEA and the Project Steering Committee;

- ethical issues arising from the collection of research data, including modalities for obtaining informed consent, data protection and data anonymisation, and consideration of potential dual use risk;

- the national and institutional legislations, guidelines and rules of conducts that PRIME partners should be familiar with when undertaking research activities;

- copies of procedures for ethical research applications and approval implemented by each partner institution.

- a list of ethics-related tasks (e.g. to obtain institutional data controller information) to be completed and included in the ethics-related deliverables added to the DoW during grant negotiations.

- Templates of information sheets and templates of consent forms as guidance for PRIME researchers, with the understanding that these would have to be customised to fit several different types of research activities and research populations.

- Information about technical data protection procedures and compliance with the EU data protection legal framework was obtained from the partners' respective institutional data controllers.

- A data log instrument was created to facilitate the monitoring of data collection activities, storage and sharing.

- A plan to ensure that research and dissemination activities did not result in undue stigmatisation and exclusion of certain groups and individuals was agreed between the Consortium partners, in consultation with the IEA. This work resulted in the delivery of a "Stigmatisation, Discrimination and Social Exclusion Mitigation Plan."

Task 2.3: Specification of Contextual Factors

This task made use of the list of contextual factors identified in Task 2.1 as the basis for desktop reviews and data collection activities which would refine the partners' understanding of the impact of these factors on the implementation of LAEE countermeasures and the adoption of the portfolios to be produced at the end of the project. Comprehensive literature reviews and legal analyses were conducted, with regard to national, European and international legislations. Based on that analysis, a list of legal constraints faced by countermeasures was generated. Semi-structured interviews and correspondence interviews were carried out with police officers from Poland, Spain, Israel, UK, India, and police officers employed by Europol in The Hague. Workshops were conducted in Warsaw, where participants included representatives of the Polish Police, Internal Security Agency and Border Guard, as well as academic SMEs. A survey was conducted in Warsaw with practitioners (representatives of law-enforcement agencies and the judiciary) and SMEs specializing in crime, forensic sciences and criminology. An additional survey was conducted at the National Police Academy in Hyderabad in India in a comparative outlook and given the key

role of international cooperation in the fight against terrorism. Contextual factors (problems, limitations and challenges) likely to affect the relevance, validity, adoption, implementation or exploitation of the operational deliverables of the PRIME Project were identified based on these combined research activities.

Task 2.4: Verification of Contextual Factors

Activities for this task involved coordination between UCL, UoW and KCL to ensure that the contextual analysis was taken on board when planning the research activities (stakeholder and end-user interviews; public surveys) which would inform the development of countermeasure and communication measure requirements for the countermeasure portfolios in WP7 and WP8.

WP 3: Data Requirements

Objectives:

The overall aim of this work package was to characterise the key concepts and constructs which are the concern of the PRIME project and set out the analytical framework, which would inform, organise and coordinate the data collection activities of the Consortium.

To achieve this overall aim, the WP's objectives involved:

- Agreeing and specifying definitions of key terms of reference, including lone actor extremists, terrorism, and radicalisation.
- Agreeing the boundaries between the three phases of lone actor extremist events described in the DoW (radicalisation, attack preparation and attack).
- Articulating a general risk analysis framework (i.e. a theoretical framework) which informed the understanding of the project's data needs and the interpretation of results in WP5 and WP6.
- Specifying the data needs, notably for WP5, and mitigate the risk of data gaps.
- Ensuring that the data collected is fit for purpose (which includes consideration of ethical requirements set out in WP2).
- Informing the specifications for WP4 (Meta-Script), WP7 (Counter-Measures) and WP8 (Communication Counter-Measures).

Task 3.1: Risk Identification

The main purpose of this task was to define the problem domain which is the concern of the PRIME project – lone actor extremist events – by generating and agreeing upon an operational definition, which would guide data collection activities, notably those taking place in WP5. Once the boundaries of the problem domain were agreed, the task would proceed by reviewing the knowledge-base on lone actor extremist events.

The key products of the task are:

- A review of the state-of-the-art of literature on lone actor radicalisation, attack preparation and attack processes, as well as a review of the literature in cognate domains (e.g. group radicalisation).

- A conceptual analysis of the definitional needs of the project, which bridges the requirements of scientific and engineering developments in terms of the risk analytic framework and the practical requirements of stakeholders. The analysis identified that problems of definitional compatibility could be circumvented by distinguishing clearly between conceptual and operational definitions. This work drew on stakeholder engagement activities in WP2 "Context Analysis" and WP7 "Countermeasure Requirements", and discussions with External Advisors.

- Specification of conceptual and operational definitions (i.e. terms of reference).

Task 3.2: Development of the Risk Analysis Framework

This task set out to chiefly to specify a theoretical background and extent risk analysis framework which would identify the key conceptual dimensions of lone actor extremist events, in order to inform conceptually meaningful definitions of the problem and inform the data collection and modelling activities to take place in WP4, WP5 and WP6.

The main outcome was the specification of the PRIME Risk Analysis Framework, which articulates conceptual categories of causal factors and causal mechanisms theorised to be key to the explanation of LAEEs, based on reviews of the state-of-the-art in criminological propensity development and criminal event models and research on radicalisation, attack preparation and attack in a terrorist context. The RAF sets located these factors and mechanisms at their respective level of analysis (individual, situational, social ecological, systemic).

For ease of reference and dissemination, the RAF was summarised in a **Risk Analysis Matrix.** The RAM (and the accompanying framework) offers a significant step forward in providing stakeholders with guidance as to which most likely processes to disrupt in order to prevent LAEEs at each phase of the event and in moving risk assessment towards risk analysis, allowing end-users to make informed decisions about the meaning of risk and protective indicators which are unstable across context. It stands alone as a guiding tool for risk analysis to address the concerns expressed by end-users through engagement activities and the Expert Advisory Board, who pointed out the lack of tools to support risk assessment in a lone actor terrorist context.

Although the products of this WP are intermediary with regards to the project's ultimate deliverables, the risk analysis framework, risk analysis matrix, data collection tools, as well as the articulation of a specific approach to the specification of terms of reference (definitions) which wilfully combines analytical and pragmatic considerations that are commonly thought to be at odds (i.e. academic and stakeholder perspectives) could have a significant impact on the overall knowledge-base in the domain of terrorism studies.

Task 3.3: Specification of Data Needs

The purpose of this task was to translate the RAF into data requirements needed to 1) develop and validate the radicalisation, attack preparation and attack subscript in WP5; and 2) develop the scripting tool in WP4.

Its main contribution was an inventory of data needed to achieve key project objectives (development of scripting tools and RAPA subscripts) in light of the RAF and cognisant of project constraints.

Three levels of datasets were identified as necessary for the development of the script and subscripts:

- A Large-N dataset (120+) based on an update and expansion of the Gill et. al. dataset of US and European lone actor terrorists, to which would be added a dataset of Israeli cases, required for the implementation of a statistically-based approach to script development.

- A Medium-N dataset of 20-45 cases to allow for a timeline-driven analytical approach to LAEEs across all three phases of the event, as well as across ideological and geographical areas, which would complement the statistically-derived script.

- A Small-N dataset of 5-10 case studies to provide in-depth contextual information unlikely to be captured by the Large-N script and to serve an illustrative purpose in the final portfolios.

Likely sources of data for each dataset were identified and categories of data were elicited, which should be represented in at least one of the datasets to permit analyses of key processes identified in the RAF and would inform the design of data collection instruments.

Task 3.4: Integration and Verification of Data Needs

The purpose of this task was to assess the quality of the data collected, chiefly for the purpose of building the subscripts in WP5, but also the counter-measure reviews to be conducted in WP7 and WP8. The main outcome was to identify qualitative and/or quantitative gaps in the data collected in the first half of the data collection period.

Additional data requirements were identified to be met in the second half of the data collection period in WP5, notably the need to add a set of questions to the Large-N codebook to strengthen the statistical analysis (and scripting) of the radicalisation phase, informed by the preliminary analysis of the medium-N radicalisation dataset.

WP 4: Meta-Script Technical Development

Objectives:

WP4 was concerned with the development of the scripting methodology to be used in PRIME to model lone actor extremist events. The objectives of this work package were as follows:

- To elaborate a framework for the development of a formal approach to the design of lone actor event scripts, informed by the risk analysis framework produced in WP3, including the specification of a script ontology (key concepts).

- To specify the methodology to be adopted by the subscript developers in WP5, notably to inform the approach to data collection. To formulate a prototype meta-script using a sub-set of data on lone actor extremist events.

- To design the scripting tool to be employed to create subscripts in WP5 and the integrated script in WP6.

- To calibrate the scripting tool iteratively, using subsequent datasets, in consultation with partners with script-development responsibilities.

Task 4.1: Development of Scripting Approach

This task identified existing limitations with approached to crime scripting:

- Crime scripts have tended to be synonymous of physical action scripts that did not include changes occurring "in the mind" of the offender, per se.

- Crime scripts found in the literature have been generated in a relatively intuitive way. The methods used to elicit the reported activities and their sequential or relational logic have rarely been made explicit.

By contrast, within PRIME, crime scripts were envisaged as representations of much broader processes, encapsulating together physical and mental changes (such as 'being radicalised') in the same model. This broader approach offered the ability to describe different types of events as state changes, giving researchers the opportunity to represent and analyse with them using models of the same type.

This was important contribution to knowledge and practice, to the extent that scripts are used to highlight the elements that ought to be altered in order to a prevent crime; taking into account non-physical changes (or the factors that contribute to those) can provide additional information that can offer new avenues to those designing detection and prevention measures.
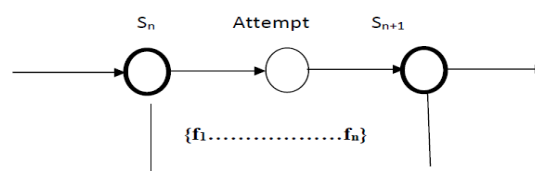
Concept of states and progression between states in crime scripts

Task 4.2: Specification of Scripting Methodology

Following the general approach laid down in Task 4.1, the researchers articulated the elements that would frame the design of the crime scripting methodology. These concerned primarily:

- The coding of data recorded in PRIME

- The generation of a Bayesian Network from such data

The vast majority of published research using Bayesian Networks in the security field is concerned with forensics applications, whereby evidence is used to draw inferences about the identity of the perpetrator. This is, to our knowledge, the first application of this technique to generate terrorist event scripts, or even crime event scripts more broadly.

Task 4.3: Design and Calibration of Scripting Tool

In Task 4.3, the operationalisation of the proposed crime scripting tool progressed from a rough concept and a synthetic dataset to a demonstrable prototype. A simple test model was constructed from the Medium-N attack dataset.

The Bayesian model represents the conditional probability of certain events occurring as a function of the occurrence of other events. Such an approach is perceived to significantly contribute to the analytical capability of the research team, with potential benefits on the creation of interventions.

Whilst the analysis of the Medium-N dataset showed that the modelling approach was logically sound and usable, it was found that it did not contain enough information to produce exploitable results. However, this observation reflected the combined characteristics of the studied crime phenomenon and available dataset (heterogeneity and sample size), rather than limitations of the crime scripting tool. The task therefore informed the PRIME data collection teams as to the value of the Medium-N dataset, as a source of specification of key variables and interpretation of the results, rather than in providing additional information for the statistical analysis of the model.
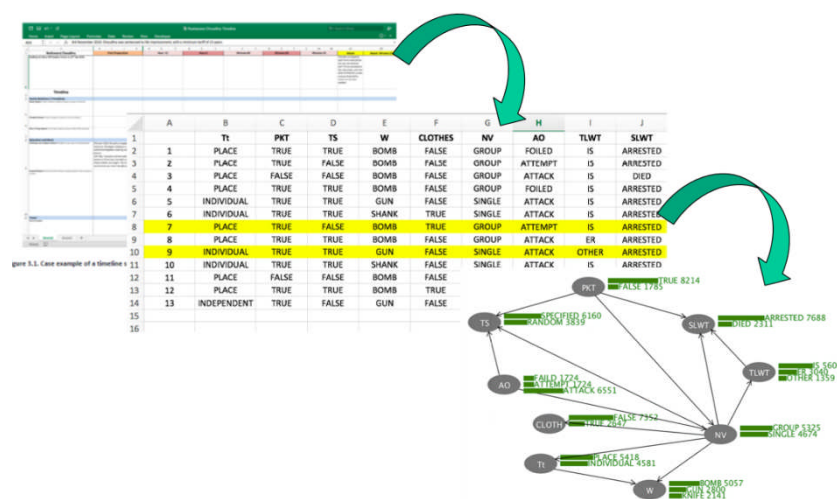
Representation of process for the production of a simple Bayesian Network for the Attack phase

Task 4.4: Verification

The verification activity consisted of exchanges between the scripting tool development team and the researchers in charge of collecting data for the Medium-N Attack sample, which was chosen to 'pilot' the conceptual and technical work undertaken in WP4, before rolling out tools and advise to all scripting teams. The purpose of these conversations was to establish the kind of advice and support scripting teams would welcome and best use coming from the scripting tool development team. More broadly, the WP4 leader was kept appraised of the data being collected by the scripting teams and preliminary analysis, to anticipate any necessary technological adjustments.

Once the WP5 and WP6 analytical activities got under way, the WP4 team provided support and guidelines for all partners, whose tasks depended on the exploitation of script-generated products. The analytical approach to data adopted throughout is summarized in the figure below. The PRIME empirical analytical strategy was designed to capitalise on the strengths and minimise the limitations of both qualitative and quantitative approaches to data collection and analysis, including scripting.

WP 5: Events Scripting

Objectives

WP5 was one of the project's core packages. Its objectives were as follows:

- To collect the data needed to develop the radicalisation subscript, informed by the conceptual and technical specifications emerging from work in WP3 and WP4.

- To collect the data needed to develop the attack preparation subscript, informed by the conceptual and technical specifications emerging from work in WP3 and WP4.

- To collect the data needed to develop the attack subscript, informed by the conceptual and technical specifications emerging from work in WP3 and WP4.

- To inform the development of the scripting tool in WP4.

- To carry out the analysis of the data collected and produce subscripts of each phases of the LAEE.

Task 5.1: Data Collection and Pre-Processing

This task was chiefly concerned with the collection of data relative to the three phases of the LAEE (radicalisation, attack preparation, attack), with the descriptive analysis of the data collected, and with contributing to the development of the scripting tool in WP4 by providing the development team with a suitable subset of data to develop and test the tool. This task includes monitoring activity, in order to insure that it is not discovered at the conclusion of the data collection phase that the data collected is not fit for purpose or that significant data needs have not otherwise been met.

The completion of each subscript was closely integrated with the work carried out by all teams subscript, scripting tool development, and risk analysis teams. Case selection, strategies for data-collection, and analytical approaches were closely coordinated. Each subscript team collected data on their respective phase of the LAEE, or updated an existing large dataset for use across the three phases.

Radicalisation

The radicalisation scripting team developed a data collection strategy which would allow for a combination of Large-N statistical analysis, with a more in-depth analysis of subset of cases (Medium-N and Small-N samples).

With regard to the Large-N sample, the dataset created by Gill and colleagues was used as a starting point and updated with cases through to 2015. With regard to the Medium-N, a number of cases were extracted from the Gill et al dataset (20) based on the richness of the information on radicalisation available in open sources, updated by a post-2013 set of cases (5) and a small sample of comparative cases, which do not qualify as 'lone' (4). Cases were spread out geographically and ideologically to represent the diversity of the lone actor phenomenon during the period of interest.

Data for the Medium-N sample was collected using a Timeline instrument, to enable analysis of dynamic (space-time) social processes and 'dynamise' the statistical products yielded by the Large-N Codebook. In accordance with the Risk Analysis Framework, the data collection focused on factors and mechanisms involved in lone individuals' acquisition of a propensity for terrorist violence at multiple levels of analysis, including (1) susceptibility to moral change, (2) processes of self and social selection to radicalizing settings, (3) exposure to and patterns of interaction within radicalizing settings, (4) the emergence of radicalising settings.

Case information was supplemented by interviews with more than twenty subject matter experts (police officers working on particular LAE cases, intelligence officers, radicalisation prevention workers etc.).

Attack Preparation

In accordance with the Risk Analysis Framework, the attack planning and preparation subscript team looked at the attack preparatory and planning process from several angles, looking at how (1) the motivation for the attack was developed and maintained; (2) if, when and how the capabilities necessary to conduct an attack were acquired; (3) the temporal duration of relevant activities; and (4) the geographical location where these processes took place.

As before, the Large-N dataset was built by adding new cases to the Gill et al.'s original dataset of lone actor attacks and recoding old cases to suit the project's purposes. This was supplemented by a Medium-N dataset (47) chosen to overlap, in some large part, with the radicalisation dataset (to enable later study of the transition between the phases). To this dataset was added a Small-N dataset of 5 cases for case study. The cases were selected on the basis of access to in-depth, privileged data, enabling in-depth analysis.

An additional codebook of 72 variables (different from the variables already included in the Gill et al. codebook) was developed by the subscript team, which was used for quantitative data collection

on the Medium-N. A timeline instrument similar to the one developed for the radicalisation phase was then developed and used to collect sequential information on the Medium-N.

A large amount of information was gathered on the Small-N case studies, drawing from media articles, the academic literature and government reports. In addition, the team gained preliminary access to privileged sources regarding the three Islamist lone actor cases. The data were taken from police files and interviews with individuals involved in the investigations.

Attack

Data collection for the attack phase likewise operated at three levels. In complement of the Gill et al dataset, a list of run-over and stabbing lone actor terror attacks which have occurred in Israel between 2004-present was constructed to make up the Large-N attack dataset, based on data received from the Israeli Security Agency, which added up to over 100 incidents. All attacks occurred in Israel and the occupied territories (excluding the Gaza strip), and the offenders were Palestinians. For every event, a series of variables relating to the attack phase (e.g., weaponry, date and time, location, motivation) was retrieved from the ISA. Parallel to the ISA data mining, complementing information on each attack was retrieved from open sources in Hebrew and Arabic. The list of open sources included: court files, press releases and social networks. Examples for the additional data regained through these sources are personal details on the offender, the attack features and facilitating conditions.

With regards to the Medium-N dataset, 15 cases were identified, which overlapped with the radicalisation and attack preparation Medium-N datasets and which had progressed to the attack stage (or attempted attack). Data on these cases was collected using a Timeline instrument similar to the one used in the other two phases. This dataset was then shared with the Scripting Tool Development team (WP4) and used to learn the Bayesian Networks in D4.2, fulfilling on of WP5's key objectives.

Finally, a smaller set of cases was identified for in-depth case study. These paid particular attention to the analysis of ideology, conceived as a cognitive resource for the attacker, with implication for their perception of capability.

Task 5.2: Radicalisation Subscript

This task produced a subscript of the radicalisation phase of lone actor extremist events. Given the emphasis of the RAF on interaction mechanisms between individual, situational and social ecological levels of analysis, the analysis for this phase adopted a relational interpretative framework. Qualitative analysis of the Medium-N and Small-N samples suggested that the cases clustered around two main types of interactional relational configurations – *Peripheral* and *Embedded* – both of which were further respectively divisible into three ulterior subtypes be further divided into six further subtypes: *Withdrawn, Anti-Social, Volatile, Formerly Embedded, Autonomous and Supported.* These subtypes were classified according to their individual susceptibility, the extent of their relational engagement with radical milieus and actors and their emergence of motivation.

In addition to the identification of the two main patterns of LAE radicalisation and the production of the subscripts, we also established a number of other key findings.

Task 5.3: Attack Preparation Subscript

This task focused on producing a detailed overview of findings relevant to understanding the emergence of the motivation and capability to commit acts of violence amongst lone actor extremists during the attack preparation and planning phase of lone actor extremist events. Once data collection had been completed, research results were presented in three forms. First, descriptive statistics were utilized to discuss the characteristics of attack planning and preparation as conducted by the 47 lone actor extremists who constituted the sample used for this task. Subsequently, several lone actor attack planning and preparation (LAAPP) 'subscripts' were drawn from this data that visually represented the development of attack planning and preparation over time. The three scripts produced were 'ideal types' of patterns of lone actor preparation: a linear, a parallel and a spontaneous script pattern. The task was concluded by three case studies that complemented the statistics and the scripts with a more in-depth and qualitative look at how the motivation and capability to commit violence emerged and were maintained.

Task 5.4: Attack Subscript

This task produced a detailed overview of findings relevant to understanding the components, processes and decision making of the attack phase of terrorist acts amongst lone actor extremists. The results included a descriptive analysis of LA attackers and attack phase, in regards to 147 vehicle-borne and stabbing attacks committed between 2000 and 2016. Based on these findings, a model of lone actor attacks was produced using quantitative and qualitative analytical methods, to identify possible relationships between variables that could be developed into points of intervention. Special attention is given to the interaction between individual and situational-level factors, and the contribution of these interactions to the attack results or the possibilities for mitigation.

Special attention was given to the following main components of the decision making attack process:

1. **Target –** Characteristics, selection, journey to crime.

2. **Weapon -** Weapon-selection process.

3. **Tools and Training -** Whereby "tools" refers to items or equipment that can be used for the attack, usually associated with daily routine activities, such as documentation, transportation and technologies, including online resources.

4. **Facilitating Conditions -** The social and physical arrangements of society that increase the probability of terrorism. While the tools are the tangible elements used to execute the attack, such as cell phones, social networks or transport, facilitating conditions are the

societal and environmental circumstances that enhance the opportunity of the terrorists and increase the odds that an attack will be carried out successfully.

Two scripts were produced, one for run-over attacks and one for stabbing events, using the 15 run-over and 15 stabbing cases with the richest information. The large N sample was used for a statistical verification of the relationships identified in the scripting process and suggest related points of intervention. To allow some comparison between the Israeli attack cases and that from North America and Europe, the deliverable also present an analysis of a small set of 15 cases drawn from the North American and Western European Large-N dataset. This analysis was complemented with qualitative consideration of the ideological aspect of lone actor terrorism in Israel. To do so, the main ideological justification for lone actor terrorism in Israel – Salafi-Jihadi frames and material – was analysed. Specifically, the team examined how online network encouragement support lone actor decision-making in regards to the attack process.

Task 5.5: Subscripts Validation

Several activities were organised to validate the outcomes of Tasks 5.2, 5.3 and 5.4; that is, to run the scripts and other findings past end-users and subject matter experts to gather their feedback and advice. Further details of these activities and their impact is available in the impact section of this document.

WP 6: Script Integration

Objectives

WP6 was the second core work package of the project. Its objectives were as follows:

1. To integrate all three subscripts into a script of lone actor extremist events, ensuring that there are no gaps or conflicts across the script's three stages (radicalisation, attack preparation, attack), and the script's multiple levels.

2. To validate the integrated script.

3. To identify categories of intervention points (aka "pinch points") for the purpose of preventing radicalisation, disrupting attack preparation and mitigating attack.

Task 6.1: Script Integration

Task 6.1 capitalised on multiple analytical techniques applied to the updated Large-N dataset. The outputs from the analyses delivered descriptive properties of LAE behaviours, whilst comparative analyses supplemented the knowledge base for current areas of interest for practitioners, including online behaviours. The geographical analyses yielded results which fit with more commonly understood distance to crime techniques, providing further depth and validation for the overall output and identification of intervention opportunities. The state transition diagram analyses, informed by the work carried out in WP5, revealed behavioural trajectories of LAEs across the three

phases of interest; radicalisation, attack preparation, and attack. This analysis supplemented WP4 and WP5, in that the analysis moved on from ordering of behaviours as in a traditional crime scripting approach, and used probability based analytical techniques to determine relationships between not only immediate neighbours in the script, but also all other behaviours analysed.

The final analysis of the Large N dataset, the Bayesian Network analysis, validated the state transition diagrams, and also presented the integrated script. One of the main advantages of the Bayesian Network over the state transition diagrams is that it is 'playable' or interactive. Information (for example, about the presence of a particular weapon) can be fed into the network and this one will automatically recalculate the probability for other indicators in the network.

Task 6.2: Script Piloting

This task involved running the outcome of the analysis carried out in WP6, in particular the scripting efforts (state transition diagrams and Bayesian networks) past end-users and subject matter experts to elicit their feedback. The details of the activities conducted during this task overlap with the dissemination and training activities described in WP9 below, where feedback was systematically elicited from participants in these events.

Task 6.3: Identification of Intervention Points

This task proceeded from the development of the scripts and other analytical products in WP6 and WP5. Plans were initially to derive intervention opportunities only from the integrated script in WP6. However, the variety of data collected and analyses conducted in both WP5 and WP6 led to a greater richness of findings than anticipated and the 'intervention points' were derived from the subscripts as well as the integrated script, for the greater benefit of the project.

As well as a general list of intervention point categories (for use at the strategic level), the task also synthesised context-specific intervention points identified through the scripting work.

Task 6.4: Generalisation

The purpose of this task was to establish the generalisability of the integrated script and of the characterised intervention points beyond the set of cases used to develop the script. As with Task 6.2 above, the details of the activities conducted during this task overlap with the dissemination and training activities described in WP9 below, where feedback was systematically elicited from participants in these events. Of particular relevance for the issue of generalisability was the international origins of our interlocutors, who came from different countries and even continent but all fed back the utility of the scripting products and intervention points in their own context.

WP 7: Counter-Measures Requirements

Objectives

WP7 involved the identification of counter-measure requirements (goals, objectives and constraints of measures which aim to disrupt the event at a particular intervention opportunity). The portfolio of counter-measures requirements was elaborated and elicited from practitioners (potential end-users and other stakeholders). The requirements took into account the contextual elements specified in WP2, which guided and facilitated the selection, design, adoption and implementation of counter-measures across contexts. The proposed measures were further validated through end-user engagement.

Specifically, WP7 researchers:

- conducted a review of existing response measures intended to defend against lone actor extremist events. This involved performing desktop searches and carrying out direct engagement with SMEs and end-users with a security remit.

- produced a set of counter-measures requirements based on the in-depth consultations with law-enforcement, security services and intelligence agencies practitioners with front-line experience, as well as the results of research performed within the selected communities at risk of radicalisation.

- summarised these findings and presented a portfolio of recommendations to be acknowledged and implemented by the end-users and stakeholders.

Task 7.1: Counter-Measures Review and Analysis

This task resulted in a comprehensive review of existing counter-measures used to defend against the lone actor extremist events at all three stages of the RAPA model (Radicalization, Attack Preparation and the Attack). The report was based on the wide-ranging review of academic literature and open-source data, thorough assessment of the legislative environment and judicial decisions referring to the countermeasures, semi-structured interviews with the personnel and officers of the national and international law-enforcement agencies and intelligence institutions (from Poland, Canada, United States, and India), and international surveys and questionnaires. The surveys targeted practitioners (representatives of law-enforcement agencies).

The first survey covered a group of fifty people from Poland, Western Europe, the United States and Canada. The second survey, aiming at a comparison of the opinions on the same issues, was performed in India.

The report identified a set of existing countermeasures to defend against lone actor extremist events, together with their strengths and weaknesses, and took note of the areas to be addressed by the further research activity.

Task 7.2: Characterization of Counter-Measure Identification Framework

Based on the conclusions of Deliverable D7.1, activities were carried out to translate the gaps and weaknesses of existing measures into a more general framework for the identification of countermeasures measures, which formed the foundation of the Counter-Measures Requirements White Paper. This involved discussions with the RAF team (UCL) to see how the gaps might be mapped onto the PRIME Risk Analysis Framework.

Task 7.3: Identification of Counter-Measures Requirements

This task delivered a portfolio of lone actor extremism counter-measures requirements, informed by the findings of the review of existing counter-measures used to defend against lone actor extremist events, the Risk Analysis Framework produced in WP3, and the outcome of analyses and identification of intervention points carried out in WP5 and WP6.

The deliverable provided the description of the counter-measures applicable at three stages of the lone-actor threat model: radicalization, attack preparation, and attack. The conclusions were based on consultation with law-enforcement and security services practitioners and Subject Matter Experts of the PRIME Project domain, representing a wide range of areas (police, intelligence, border protection, military, government, civil defence, non-governmental organizations, and the academic community) and different jurisdictions and law practices (several countries of Europe, United States, Canada, India, Japan, Georgia, Mexico, Australia and New Zealand).

Research activities to elicit countermeasure requirements included:

- Literature and legal reviews across Europe and USA

- Interviews with members of communities where radicalisation was thought to occur (36 individuals in total).

- Interviews and consultations with law enforcement practitioners (135 persons in total)

- Questionnaires with practitioners from Poland, Western Europe, United States and Canada, and serving police officers in India

Task 7.4: Integration of Counter-Measures Requirements

For this task, the leaders of WP7 and WP8 agreed a timeframe for communication regarding the integration of findings in these work packages. Further consultation occurred during the second period. The chief outcome of this task was to inform the focus of the survey carried out in WP8, so that they would complement the work carried out in WP7.

WP 8: Communication Measures Requirements

Objectives

WP8 encompassed all activities involved in the formulation of requirements for communication measures aimed at preventing, interdicting or mitigating lone actor extremist events. The objective for this final period was for KCL and AU to identify communication requirements for the prevention, interdiction and mitigation of lone actor extremist events and produce a communication framework in support of decision-making to allow stakeholders to anticipate interdependencies between communication measures and take into account contextual factors when selecting communication measures.

Activities within WP8 focused on:

1. Delivering a review of academic and grey literature that focuses on communicating about lone actor extremist events.

2. Media analysis of print coverage of lone actor extremist events.

3. Semi-structured interviews with stakeholders who have responsibility for commissioning or designing interventions.

4. Establishing a framework to identify communication measures requirements

5. Identifying communication measures requirements

6. Integrating communication requirements into a unified framework

7. Validating and optimizing communication requirements

Task 8.1: Communications review and analysis

Under this task, the following research activities were undertaken:

- A review of the academic and grey literature on communication in the context of terrorism, with a particular focus on the literature on lone actor terrorism.

- An analysis of 219 UK and 97 Danish national newspaper articles which focused on the topic of lone actor terrorism during the period 1 January 2009 – 28 February 2015.

- In-depth interviews with 22 UK and 8 Danish stakeholders from central and local government, police and security services, faith and community groups, and prevention programme providers and community outreach groups.

The key output was a review of existing communication measures related to lone actor extremism, which found, among many other things, that there has been very little focus to date on communication measures specifically designed to address LAEEs.

The main insight for communication from the academic literature that focused specifically on lone actor events was in relation to the importance of information leakage in the interdiction of LAEEs and the need, therefore, for communication measures that encourage reporting behaviour.

However, very little guidance was provided either in the lone actor literature reviewed or the wider terrorism literature regarding good practice for communicating to encourage this behaviour.

The review also addressed the lack of empirical and evaluative research in the academic literature reviewed regarding the use of communication measures to counter radicalisation; a comparative analysis of UK and Danish media coverage of 'lone wolf terrorism' over the past five years; the different audiences for CT messages and the advice provided; the different framings of lone actors in the UK and Denmark; communication related to business and community groups; and comparative communication strategies in the prevention, disruption and mitigation spaces between the two countries.

Task 8.2: Characterization of Communication Framework

A Lone Actor Terrorism Communication Framework (LACF) was developed in Task 8.2 in support of planning organisation-specific communication targeted at preventing, interdicting and mitigating lone actor extremist events. This framework was designed to help practitioners communicating about lone actor terrorism to adapt the information provided in the Communication Measures Review carried out in Task 8.1 and the Communication Requirements Report delivered at the end of Task 8.3.

Overall, the LACF is intended to support decision-making, enable interdependencies or interference between communication measures to be anticipated, and allow contextual factors to be taken into account when selecting communication measures. It will guide and facilitate the selection, design, adoption, and implementation of communication measures across contexts and recommend criteria for evaluation of the measure's impact.

Task 8.3: Identification of Communication Measures Requirements

Communication requirements for preventing radicalisation, interdicting attack planning and mitigating attacks carried out by lone actors were scoped in Task 8.1. In Task 8.3, they were tested using three large national surveys in the UK and Denmark and integrated with findings from the PRIME Context Analysis, Events Scripting and Counter-Measures Requirements.

Prevention

Communication requirements for the prevention of LAEES were informed by semi-structured interviews conducted with individuals responsible for the commission, design and delivery of communication measures. These interviews were conducted during the first reporting period and key findings have already been presented at the mid-term review and reported in full in D8.1.

Interdiction

Communication requirements for the interdiction of LAEEs were informed by data that was collected as part of Task 8.3, namely an online survey conducted with 3005 members of the public in the UK and Denmark to test the impact of the 'See it, Say it, Sorted' campaign on intention to report suspicious behaviour in the context of a mainline train station.

Additionally this survey tested the impact of this guidance on barriers and drivers for reporting identified in the literature and established whether perceptions about the police that are known to have an impact on crime reporting more generally hold in the context of a lone actor scenario. By employing a two-stage scenario that opened with the description of someone who appeared to be filming a station CCTV camera and moved on to a situation in which it was apparent that this individual had been systematically filming all cameras on the station, this study was also able to explore the impact of certainty on intention to report suspicious behaviour.

Mitigation

The evidence-base for the communication requirements for the mitigation of LAEEs was supplemented by data from two surveys: an online survey of 3003 members of the public in the UK and Denmark to test responses to an existing communication measure ('Run, Hide, Tell') and an online survey with additional 3000 members of the UK and Danish public, which tested messages designed in Task 8.2, with a view to improving the behavioural impact of existing 'Run, Hide, Tell' messaging.

Based on the analysis of the survey findings and engagement with stakeholders, the team identified communication requirements for preventing radicalisation, and interdicting and mitigating LAEEs.

Task 8.5: Validation and Generalisation

The Communication Measures Requirements identified in this work package were validated through a series of meeting with stakeholder and end users including UK government and security services (the Home Office, NaCTSO, CPNI, BTP), the Danish security services (PET), the Dutch National Coordinator for Security and Counterterrorism (NCTV) and with US police (NYPD). These consultations validated our initial findings and led to the decision to conduct an additional survey to strengthen the evidence base for recommendations relating to communications to interdict lone actor extremist events (LAEEs), to supplement data from the two surveys we had committed to deliver in the PRIME Grant Agreement Description of Work. WP8 research findings have been extremely well received by stakeholders. The UK owners of the communication measures that have been tested are planning on incorporating PRIME research findings into future iterations of these campaigns. Security services in the Netherlands and Denmark have also expressed an interesting in developing similar communication campaigns in their countries.

WP 9: Dissemination

Objectives

WP9 comprised all activities involved in the dissemination of the project's findings and outputs, in order to ensure the project's impact. A plan for these activities was prepared in the first period of the project via a Dissemination Strategy and Action Plan.

The dissemination for this project was always intended to be wide-ranging, encompassing all interested parties, including academia, local and national government, police and law enforcement practitioners and community stakeholders.

The objectives of WP9 were as follows:

1. To share the project's outcomes with end-users, stakeholders and other interested parties.

2. To train end-users in the use of the operational deliverables.

3. To develop and recommend a long-term vision stemming from the project's findings.

Task 9.1: Dissemination Strategy and Action Plan

During their second Steering Committee Meeting, the PRIME partners formally ratified the project's Dissemination Strategy. This document outlined the PRIME project dissemination strategy and dissemination action plan, including actions which partners will be expected to take at certain points in the lifetime of the project to bring about the overall dissemination vision of the project.

This document was produced by the Dissemination Coordinator with input from the Project Coordinator, the End-User Engagement Advisor and all partners. It set out how to involve stakeholders and end-users in a range of activities, including workshops, briefings, training (masterclasses and online webinars) and a conference dedicated to PRIME, not only providing an outlet for PRIME's main outputs, but offering end-users and stakeholders from a number of interested communities (security practitioners, police practitioners, policy-makers, civil society organisations) a dedicated opportunity to meet, network, and discuss issues specifically related to the lone extremist problem.

The Dissemination Action Plan included a list of planned activities that was set down as a roadmap to enable the Dissemination Strategy of the PRIME project. The activities of the Dissemination Action Plan were coordinated by the Dissemination Coordinator (DC). However, it was made clear that all the PRIME partners would be involved in various aspects of the dissemination activity., and indeed the partners engaged in over 100 dissemination activities in the first eighteen months of the project alone. More details are provided in the impact section of this document.

Task 9.2: Policy workshops

The PRIME project committed to deliver three one-day workshops for end-users in order to disseminate the project's key findings and encourage adoption of our work. In the end, we delivered four key workshops, as below:

Date: 22nd November, 2016.

Venue: Auckland, New Zealand.

Attendance: 40-50. Attendees included clinical psychologists, psychiatrists and policy makers from Australia and New Zealand in the fields of countering violent extremism.

Date: 14th February, 2017.

Venue: Singapore.

Attendance: 30. Attendees included policy makers and practitioners from across Singapore.

Date: 25th April, 2017.

Venue: Dublin, Ireland.

Attendance: 120. Attendees included policy makers and threat assessment professionals from 20 different European countries.

Date: 28th April, 2017.

Venue: Copenhagen, Denmark.

Attendees: The workshop was attended by 25 participants, including key national level policy advisors from the Ministry of Refugees, Immigrants and Integration, the National Center for Prevention of Extremism and the Ministry of Justice. In addition, participants included practitioners working with radicalisation prevention and interventions from 7 different Danish municipalities, 4 regional police forces, the National Police Force and the Danish Crime Prevention Center.

Task 9.3: End-user Training

The PRIME project committed to deliver three masterclasses to train end-users in the handling of the project's operational deliverables. In the end, we delivered six key masterclasses, in countries around the world, to a host of practitioners. Feedback has been overwhelmingly positive for these masterclasses. They are as below:

Date: 26 April 2016

Location: National Police Academy, Hyderabad, India.

Attendance: 80+. Senior officers of the Indian National Police representing all 29 states of India.

Date: 11 May 2016.

Location: Safeguarding Australia 2016. Protecting the Homefront. The 13th National Security Annual Summit. Canberra, Australia

Attendance: 50. Law-enforcement, security services, scientific community from Australia, New Zealand, South-East Asia, Japan.

Description: "Digital forensics and digital intelligence in countering violent extremism and

Date: 2 & 3 February 2017.

Location: Portland Police Training Division, Portland, Oregon, USA.

Attendance: 200+. US Law enforcement.

Date: April 6, 2017

Venue: Kings College London, England.

Attendees: 17. UK law enforcement practitioners, originating from several agencies.

Date: April 27, 2017

Venue: Copenhagen, Denmark.

Attendees: 25. Key stakeholders from the Danish Security and Intelligence Service, 5 regional police forces, emergency response agencies, Copenhagen Airport Security and the National Police Force Prevention Centre.

Task 9.4: Other Dissemination Activities

Over the three years of the PRIME project, the Consortium members carried out close to 300 dissemination and impact activities (with a number of papers still in preparation – not included in the figures below). A break-up of these activities is provided in the next section.

IMPACT, DISSEMINATION AND EXPLOITATION

Over the three years of the PRIME project we are pleased to report that the team has carried out close to 300 dissemination and impact activities (with a number of papers still in preparation – not included in the figures below – and a Project Handbook for practitioners also being prepared). A break-up of these activities is provided in Table 1 below.

What is immediately noticeable is the very large number of end user oriented activities including presentations, briefings, workshops and masterclasses. Added to this is the considerable number of media briefings covering such significant and widely distributed media outlets as Arte TV programme in France, The New York Times, The Irish Examiner, The Huffington Post, The Guardian, The National Post.

Table 1: Break-up of dissemination activities

| Type of activity	No. carried out
Publications	14
Presentations to scientific/academic audience	107
Workshops and training classes to end users	13
Presentations and briefings to end users	81
Media briefings, articles, TV etc	61
Other – exhibitions, public events, advisory group etc	19
Total	295

Particular highlights of the dissemination activity include:

- Briefings to the Government Security Secretariat, Cabinet Office, UK by Dr Noemie Bouhana and Dr Paul Gill, and to the National Crime Agency in the UK by Dr Noemie Bouhana which placed this project firmly on the radar of the top individuals dealing with this threat in the policy and crime response arena in the UK.

- Media briefing to the New York Times by Dr Paul Gill: "*Europe Focuses on Emerging Threats From Smaller Crews of Terrorists*"

- Interview in NATURE magazine by Dr Noemie Bouhana entitled "Psychologists seek roots of terror: Studies raise prospect of intervention in the radicalisation process."

- Workshop organised in Poland by University of Warsaw entitled "Radicalisation, extremism and lone-wolf terrorism. Threats-problems-challenges.' Over 50 individuals from the law enforcement and security sector in Poland attended.

- "Teaching Counter-terrorism in London", a TV documentary featuring Dr Noemie Bouhana by the prestigious Arte channel in France.

- PRIME project stand at the Counter Terror EXPO in London in 2016, attended by 9000 industry practitioners

- Invited keynote lecture by Dr Noemie Bouhana at Trinity Hall, Cambridge University "Understanding violent extremist events"

- "Shaping Applied Research on Lone-Actor Terrorism. An FP7 PRIME Research Initiative" by Dr Emily Corner to 71st Annual Meeting, The American Society of Criminology, Washington DC

- "Nice attack: when the mundane can be used for acts of terror, how do we protect people?" – article for The Conversation by Dr Herve Borrion, circulation of 16000.

- 'Soloterrorister taler med familie og venner om terrorplaner', interview by Dr Lasse Lindekilde to Danish Radio Online (ww.dr.dk)

- Workshop on defining 'lone actor terrorism' held in cooperation with RUSI.

- "EU-funded project casts eye on lone actor terrorist problem" – interview by Dr Noemie Bouhana for Security Europe online magazine

- A series of policy workshops and training masterclasses (led by HUJ) conducted in the last six months of the project to a wide variety of end users in a variety of countries

- A final conference (led by KCL) attended by a wide range of senior end users

- An exceptionally wide range of presentations about the PRIME project to audiences in countries all around the world. This includes the following organisations and conferences:

  ➢ the Indian Police Service at the Indian National Police Academy; **India**

  ➢ Toronto Police Homicide Division, **Canada**

  ➢ Public Safety Canada, Ottawa, **Canada**

  ➢ Internal Security Agency of the Republic of Poland, **Poland**

  ➢ EUROPOL, The Hague, **The Netherlands**

  ➢ Max-Planck Institut and Dresden University of Technology, **Germany**

  ➢ Fraunhofer Institut, Leipzig, **Germany**

  ➢ Annual Conference of the European Society of Criminology, **Portugal**

  ➢ Annual Danish Political Science Association Conference, Vejle, **Denmark**

- Research unit of ISA–Israel Security Agency, Tel Aviv, **Israel**

- Young Nordic policing seminar in Oslo, **Norway**

- Stockholm criminology conference, **Sweden**

- John Jay College of Criminal Justice, **USA**

- IBM T.J. Watson Research Laboratories. **USA**

- Society for Risk Analysis, Denver, Colorado, **USA**

- Dutch intelligence service (AIVD), **The Netherlands**

- Spanish Police, Border Protection), **Spain**

- New Zealand Parliament, **New Zealand**

- Border Police Tbilisi, **Georgia**

- Police Federal, Cancun, **Mexico**

- Association of European Threat Assessment Professionals, **Belgium**

- Norwegian Police Security Service, **Norway**

PRIME also maintained a project website (http://www.fp7-prime.eu/) and a Twitter account.
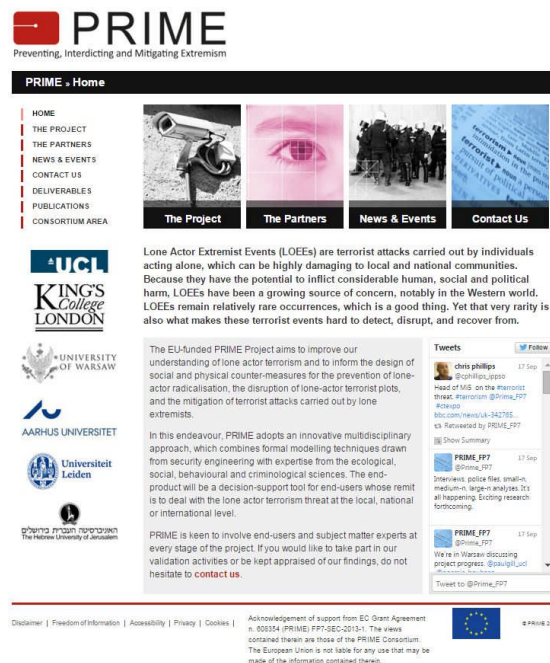

Website homepage

Twitter engagement for the project via our website

Final project conference: A key element of our exploitation activity

The PRIME final conference took place at The Royal Society, London on Friday 7th April 2017 (see Fig. 1 below for the programme). The aim of this conference was to encourage exploitation of our research. The conference was structured around three main activities:

- A plenary session in the Welcome Trust Lecture Hall
- Poster presentations in City of London Rooms 1 & 2
- Networking sessions, including a post-conference networking drinks reception

165 people registered to attend the conference. A total of 127 people (excluding PRIME project partners and external speakers) attended on the day. The majority of participants were from government and security services (25% national government, 22% police, 17% prison/probation services, 8% local government, 7% health sector, 6% intelligence services, 6% from academia or think tanks, 4% security consultants, 3% from community and religious organisations and 2% from transport and military sectors). Participants from UK national government included representatives from the Home Office, Cabinet Office, Ministry of Justice and Department of Health. Local government representation ranged from Scottish Government to London Local Authority Prevent providers. The conference was also attended by representatives from government and security services from Denmark, Germany, the Netherlands and the USA.
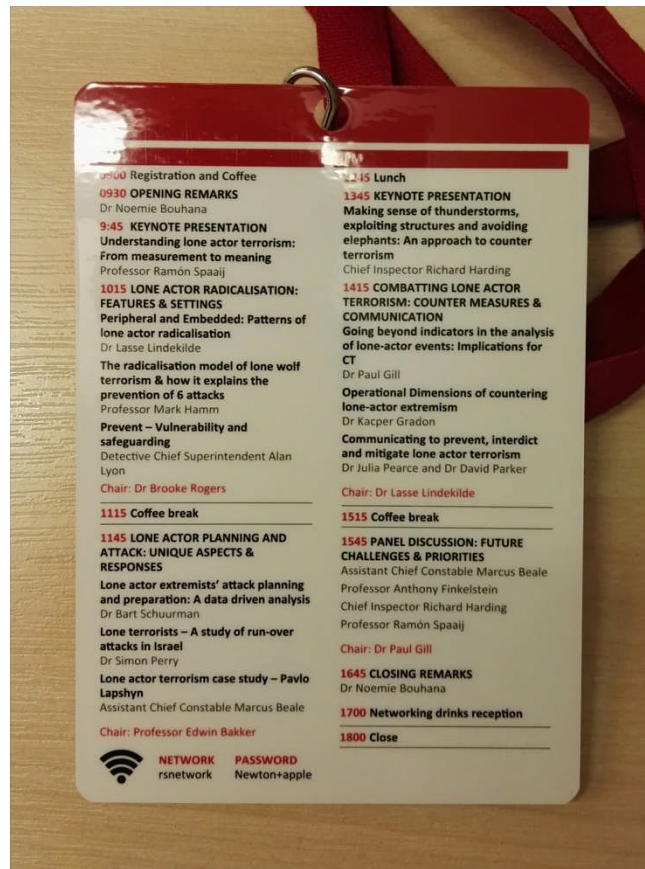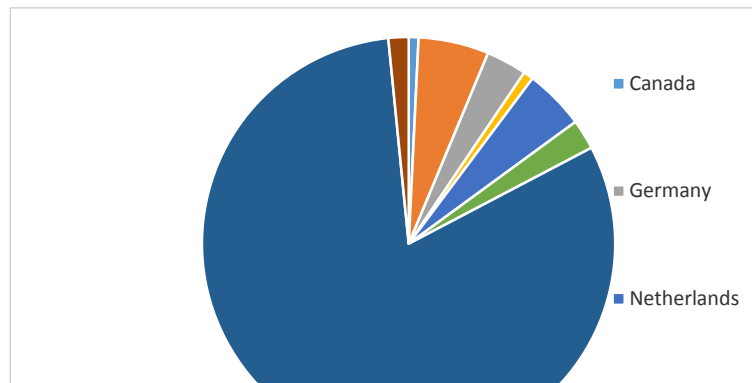
Fig. 1: The conference programme – printed onto the back of name badges so that attendees could take away key information about the day

Figure 2 shows a breakdown of participants by sector and Figure 3 shows a breakdown of participants by country.
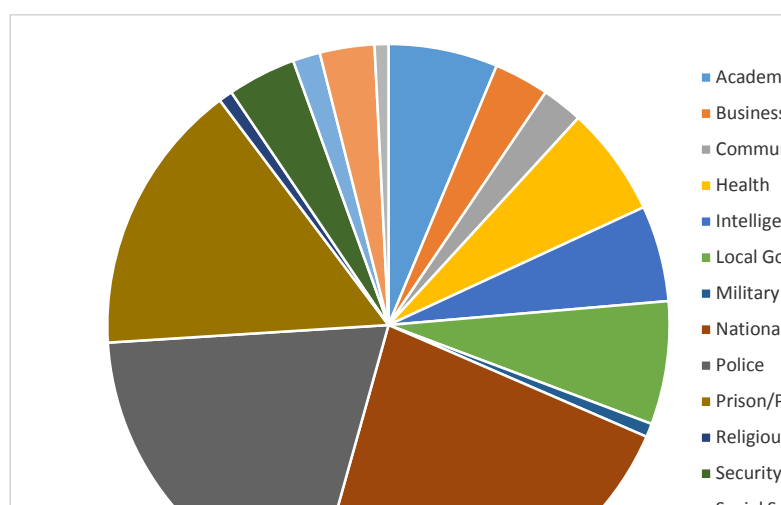
Fig. 2: Participants by sector

Fig. 3: Participants by nationality

The conference was very well attended; in fact, such was demand that we were unable to accommodate everyone who wished to attend. Those who we were unable to include have been added to our mailing list and were sent a copy of the posters. Following the conference, we received a number of emails which indicated that participants had found it to be a valuable event. A selection of these comments are provided below.

Feedback regarding the final project conference:

"Very impressed by the breadth of knowledge and discussions generated during the event. As a frontline practitioner on these matters and as one of the faces of my organization working these matters in partnership with the UK, I benefited from attending" (US security services)

"Many thanks for enabling me to attend your conference on Friday and well done!" (UK police)

The ACC that I attended with was very impressed too at the work between law enforcement and academia. I felt it was of great benefit and produced lots of good ideas and practical direction to explore further" (UK police)

"Thank you again for inviting me for the PRIME final conference. I really appreciated it! If and when we have similar events rest assured that I will inform you. As for the organisation, location and even presentations everyone including myself had only words of praise. It was absolutely fantastic and will look forward for the publications to be issued from this project" (EU academic)

"It was a pleasure seeing you and all the remarkable work you managed to get done with the exceptional people in your Center and network. Congratulations for excellent presentations! You certainly succeed in bringing the communication issues front and center in the response to critical events. I was very impressed by the Prime project colloquium. I really enjoyed your talk and your poster" (International academic)

"Sorry I didn't get a chance to speak to you on Friday. It was a fab event, really interesting" (UK National Government)

"I had such a good day… there has clearly been some academic developments through PRIME… And more than happy to engage further as your research develops…" (UK police)

"Thank you for making contact, it was a pleasure and a worthwhile event" (UK police)

Potential impact from the project and future exploitation of the work

The PRIME project has, from the very beginning, adopted an active stance towards ensuring that the research generated by the project will yield real world impact. In an era where lone actor attacks are making headline news on an almost weekly basis, our work seems to be more topical than ever. This is reflected in the wide variety of media interviews and briefings that have been given by the team members, and the enthusiastic response to the policy workshops and masterclasses that we delivered. We present here our own assessment of potential impact from our work and future exploitation plans which will be undertaken by the PRIME partners.

Exploitation plan - UCL

In the UK, a collaboration between Co-I Gill, the North-West Counter Terrorism Unit (under the auspices of the Greater Manchester Police) and a clinical psychologist was initiated with the aim to turn the products of WP5 and WP6 into concrete tools for intelligence enrichment and risk management. Originally a pilot project in the greater Manchester region, it has now become a national tool. Bouhana, Gill and Corner are also members of a risk assessment and management

working group, which brings together practitioners from several security and law enforcement agencies, and which meets every 6 months. The work of PRIME, notably the risk analysis framework and scripting, has fed directly and will continue to feed into the work of the working group to elaborate better risk assessment tools in a terrorism context.

Moving forward, Gill and Corner will continue their work with the North-West Counter-Terrorism Unit. This will involve access to closed source data on lone-actor terrorists across the U.K. Their work will also continue with the Fixated Threat Assessment Centre and access to their data. In July 2017, the UCL team and Aarhus begin a 3-year funded project funded by MINERVA, led by Bouhana, which will look at the social ecology of radicalisation across three different European settings (Northern Ireland, UK, Denmark). This project builds upon the radicalisation model of the risk analysis framework elaborated on during PRIME. In August 2017, Gill, Corner, Bouhana and Marchment are due to begin a 2-Year Public Safety Canada funded project on risk assessment protocols. Currently Gill is short-listed for an ERC Starter Grant and research on different aspects of lone-actor terrorism will hopefully continue there. In January 2018, Corner starts a new position at The Australian National University. There, she will be using the probability analyses from WP6 within her research and her consultancy work. Finally, UCL will continue to disseminate the findings and techniques developed through PRIME through its teaching activities, at undergraduate, master and doctoral levels.

Exploitation plan - HUJI

The large N analysis of run-over and stabbing terrorism Israeli data set, leading to the scripting of method specific attacks as part of WP5, were very well received among a diverse audience of Israeli and international practitioners.

The findings, as well as the potential intervention points deriving from them, were presented to practitioners and discussed with them in several occasions. During data collection, central findings were discussed with representatives of the Israeli Security Agency, HUJI's main source of privileged data. Practitioners and decision makers within the ISA expressed substantial interest in the research findings, and were very involved in the analytical process. The main products of WP5 were then presented and discussed in a series of local and international masterclasses, held separately in Jerusalem, London and Copenhagen. Each of these masterclasses included 15-30 participants, representing different law enforcement agencies. The masterclasses were designed and executed to be end-users oriented, leaving a wide room to discussion and feedback. An evaluation survey completed at the end of the masterclass held in Copenhagen revealed that participants felt the workshop was highly applicable to their job, and that they will be very interested in attending similar events in the future.

Going forward, Simon Perry and Badi Hasisi will continue to study radicalisation in another FP7 project – PROTON. PRIME's results will inspire the work done in PROTON and will be further developed beyond the scope on lone actors. Additionally, the main findings from PRIME will be integrated into HUJI's professional MA studies, aimed for police officers and counter-terrorism professionals. This will ensure that the knowledge accumulated in PRIME will be passed on to the relevant end-users far beyond the project's lifetime.

Exploitation plan - Aarhus University

The radicalisation sub scripts produced within the framework of WP5 has been well received amongst practitioners. In Denmark, a collaboration between the WP-lead, the Danish National Center for the Prevention of Extremism (under auspice of the Ministry of Integration) and other stakeholders has been initiated with the aim to turn the products of WP5 into concrete tools for radicalisation prevention. First and foremost, the radicalisation subscripts will be used as maps to plot imperfect data that practitioners may hold on particular individuals deemed at risk of radicalisation. This tool may potentially be used across the country by teams of practitioners tasked with assessing individual cases of radicalisation. Secondly, work has begun to incorporate the pathways of LAE radicalisation identified by the radicalisation subscripts into basic course material used for educating radicalisation prevention practitioners and for awareness workshops targeting frontline personnel such as school teachers, social workers etc. The results are being used as a part of the Danish Police School´s teaching module on risk assessment vis-a-vis lone actor terrorism. The Co-PI of this WP is currently negotiating with the Danish Ministry of Refugees and Integration a format to use the scripts to teach classes to Danish counter-radicalisation practitioners.

The WP8 results of the effects of pre-event risk communication on public perceptions of terrorism and behavioural intentions has led to the application of further research funding. For example, a grant application has been submitted to the Danish National Research Council, which includes a follow-up study to survey 2 of WP8, investigating with parts of the same sample potential long term effects of being exposed to the 'Run, Hide, Tell' message. Furthermore, David Parker (partner at KCL) has won a Marie Sklodowska-Curie fellowship to come to Denmark to work for two years with Lasse Lindekilde (AU) on a project focusing on communication to prevent radicalisation, which builds on WP8 findings.

Exploitation plan - Leiden University

Within WP5, the UoL team worked on the intermediate phase of lone-actor attack planning and preparation. Because it dealt with the acquisition and maintenance of both the motivation and the means to carry out acts of terrorist violence, this phase of the RAPA framework offered some of the most salient findings with regard to opportunities for early detection and prevention. To allow the findings to have an impact on the work of counterterrorism practitioners, to test whether the findings resonated with those practitioners and to incorporate feedback from these potential end-users, the UoL team has undertaken considerable dissemination efforts, particularly in the PRIME project's final months. As detailed in the dissemination log, numerous presentations were given to police and security service personnel, as well as mental health practitioners, academics and the general public. Although focused on the Netherlands, some of these presentations were held in the UK, Denmark and Israel, thus allowing the findings to reach a broad and international audience. The results offer a practical look at various aspects of lone actor attack planning and preparation that challenge several prevalent notions about these individuals and offer concrete suggestions for (improving) early detection and prevention. The work has been well-received, with several parties expressing interest in adopting the PRIME methodology to study lone actors trained or inspired by IS.

The project's impact was further developed by incorporating the UoL team's findings in the curriculum of the professional learning courses on terrorism that Leiden University offers to professionals. Additionally, the rise in (apparent) lone-actor attacks in Europe in 2015-2017 provided several opportunities for the UoL team to disseminate the project's findings to a large audience in the Netherlands.

On 7 June 2017, the UoL team submitted a bid for funding to the Dutch 'Police and Science' program (*Politie & Wetenschap*). If funded, the team will use the methodology developed during WP5 of PRIME to investigate attack planning and preparation by jihadist lone actors active in the 2011-2017 period. The focus is on IS/AQ inspired individuals in particular, as the Dutch police and intelligence agency have expressed considerable concern that they represent a 'new' generation of lone actors who, due to their ties to these terrorist organisations, are better trained and therefore deadlier as well as increasingly observant of operational security measures. The aim is to provide CT practitioners with in-depth insights into how these lone actors plan and prepare their attacks and, through a comparison with the PRIME dataset that we developed, to ascertain whether they are really a distinct group in terms of capabilities.

Exploitation plan - University of Warsaw

Findings of the WP7 activities related to the counter-measures used for prevention, mitigation and interdiction of extremist events (particularly at the Attack preparation and the Attack stages of the PRIME R.AP.A. model) were presented to several potential end-users and stakeholders operating in the area of counter-extremism and counter-terrorism. In particular, these results and recommendations were thoroughly consulted with the law-enforcement and security practitioners, representing the wide range of nationalities, legal systems and problem domain, who were approached during the research phase of Project activities, and whose opinions became a foundation of the Counter-measures White Paper completed in effect of the WP7 tasks. The consulted practitioners (from Europe, North America, Australasia, India and Japan) believed that the implementation of the formulated recommendations would undoubtedly translate into the improvement of organizational, tactical and operational systems presently available to the law-enforcement, particularly if the area of cross-national exchange of information, data and best practices or know-how. We discussed the potential application of the recommended solutions with the representatives of the Polish National Police and Internal Security Agency, as well as the practitioners representing US law-enforcement (at local, regional and federal levels).

The set of designed strategies was presented to over 200 practitioners with front-line experience during the 18-hours workshops hosted by the Portland Police Training Division in the United States. The comments and guidelines arising from these discussions served the purpose of calibrating the WP7 research outcomes to the European context (as it was eventually consulted by the representatives of the Polish law-enforcement). The next step is to present the official recommendations of the WP7 White Paper to the management of the inter-agency Counterterrorism Centre (hosted by the Polish Internal Security Agency) with the suggestion of setting up the international working group of counter-extremism and counter-terrorism practitioners, as it is described and explained in the Counter-measures White Paper D7.2. The present societal impact of our work is the increased awareness of the international community of law-enforcement and security professionals on the outcomes of PRIME Project and their willingness to implement or at least consider some of the findings of our research related to

countering extremist threat. Additionally, the findings of the WP7 deliverables were presented to the scholars and practitioners responsible for the creation and implementation of the crime and violence prevention programmes led by the Center for the Study and Prevention of Violence (based at the University of Colorado at Boulder). The UoW researcher involved in the formulation of the WP7 deliverables will have an opportunity to test some of the designed solutions in the academic year 2017/2018, as a Fulbright scholar at the University of Colorado CSPV.

The PRIME-related training provided by UoW to over 200 law-enforcement professionals representing US federal and state levels is expected to be continued in the future, thanks to the establishment of direct collaboration with the Portland Police Training Division. Dr. Kacper Gradon was awarded by the US State Department with the Fulbright Senior Award and he will spend 11 months (2017/2018) working with the Center for the Study and Prevention of Violence at the University of Colorado Boulder, pursuing his research project being the immediate continuation of PRIME WP7 (Counter-measures) activities (project entitled "The role of modern technologies and open source information on social media in countering extremism" aimed to study the potential of machine learning, data mining and computer-assisted semantic analysis of natural languages for the purpose of analysis of written and spoken material potentially linked to the terrorist-related leakage behaviour). The outcomes of the Fulbright project are to be shared with law-enforcement community both in the United States and in the European Union. PRIME impact on the University of Warsaw is also directly expressed by the changes in curriculum of courses taught at the Faculty of Law (courses in Forensic Science, Crime Scene Analysis and Criminology) as well as in the framework of the newly-opened interdepartmental MSc programme in Forensic and Investigative Sciences."

Exploitation plan - King's College London

WP8 encompasses all activities involved in the formulation of requirements for communication measures aimed at preventing, interdicting or mitigating lone actor extremist events. The scientific results of WP8 are already having a direct impact on policy and practice by informing UK and Danish approaches to communicating with the public to mitigate terrorist attacks. Specifically, WP8 findings are feeding into updated UK guidance to 'Run, Hide, Tell' in the event of an attack involving firearms or weapons attack and informing discussion amongst security agencies in Denmark about whether or not to adopt this kind of pre-event communication campaign which targets the general public. So far Danish authorities have not engaged in such communication. However, having been presented with the results of the WP8 survey experiments, the communications unit within the Danish Intelligence and Security Service has expressed that they will consider this. As WP8 data collection was carried out in the UK and Denmark the immediate impacts can most clearly be demonstrated in these countries. However, our research also demonstrates that the impact of communication measures designed to mitigate the impacts of lone actor terrorism is broadly similar across national contexts. Consequently, we have been invited to brief policy makers and security services in The Netherlands and we have also presented our results to police in Poland and the USA.

WP8 focuses on all three RAPA stages and this is reflected in the verbal briefings we have provided to policy makers. We met with the lone actor lead from the Office for Security and Counter-Terrorism (OSCT) and team members from the UK Home Office Research, Information and Communications Unit (RICU) to inform their plans for communicating to prevent radicalisation in

the context of lone actor terrorism. We also met with the UK Centre for the Protection of National Infrastructure (CPNI) and communication leads from British Transport Police (BTP) to identify their information needs regarding the impact of the 'See it, Say it, Sorted' interdiction communication campaign (which fed into the design of our survey) and to feedback the results from our surveys in order to inform their approach to future communication campaigns. The impact of our research on communication measures to mitigate lone actor terrorist attacks has included the provision of briefings to the UK National Counter Terrorism Security Office (NaCTSO), CPNI and BTP on the results of our 'Run, Hide, Tell' surveys. The provision of bespoke briefings ensures that individuals responsible for the commission and design of communication measures are aware of our findings and the feedback we have received to date indicates that it will be incorporated into future communication plans.

WP8 work will be taken forward in the following ways: KCL and AaU are currently running a one year follow up study with participants from the two PRIME 'Run, Hide, Tell' surveys in direct response to UK security service requirements regarding the longer term impacts of pre-event communication. We are also in the process of establishing funding to extend PRIME research by mapping risky behaviours in the context of marauding firearms attacks to support the development of future communication campaigns. The team continue to brief government and security services across the EU to support the development of new communication measures. Furthermore, the team will ensure that research findings continue to feed into policy and practice through ongoing advisory roles (e.g. RAN, UK Cabinet Office etc.), and by directly contributing to official guidance (e.g. since completing PRIME we provided feedback on new guidance for UK businesses to encourage public vigilance following Manchester attack). Additionally, All WP8 partners regularly provide research-led lectures to undergraduate and post-graduate students in the UK and Denmark which ensure that our findings will be transmitted to the next generation of scholars.

Conclusion

The PRIME project has delivered a wide ranging and effective programme of dissemination which we believe will create the potential for significant impact and exploitation of the project's research. We continue to promote the research outputs to those who are best able to utilise them. For instance on May 3-4, 2017, just after the end of the project, we engaged a stand for the project at the Counter Terrorism EXPO in London, an event attended by 9000+ professionals from the industry. In this manner, we aim to create a lasting legacy for the project, in line with the project's objectives and long-term vision.