



European Crime Prevention Network

Predictive policing
Recommendations paper

29/11/2016

Acknowledgments

This recommendation paper could have not been written without the support and input of the experts who participated in the organized expert meeting and who gave input through mail. Therefore we are grateful to all participants: Wim Hardyns (BE), Anneleen Rummens (BE), Klaus Welter (DE), Jo Forceville (BE), Eric Van Aert (NL), Kees De Rooij (NL), Marjolijn Bruggeling (NL), Günter Okon (DE), Julia Gundlach (DE) and Marijke Visschedijk (NL).

Furthermore, we would like to thank all EUCPN National Representatives, Substitutes and Academic Contact Points for their continuous support of our work. We would especially like to thank the National Representatives and Substitutes of the 12 Member States¹ who sent us answers to the questionnaire about predictive policing. These answers form one of the main inputs into this paper. Without it, we would have not been able to write it.

Legal notice

The contents of this publication do not necessarily reflect the official opinion of any EU Member State or any agency or institution of the European Union or European Communities.

Citation

EUCPN (2017). *Recommendation paper Predictive Policing*, Brussels

Author

Febe Liagre, Strategic and policy officer EUCPN Secretariat

EUCPN Secretariat

Waterloolaan / Bd. de Waterloo 76 1000 Brussels, Belgium
Phone: +32 2 557 33 30 Fax: +32 2 557 35 23
eucpn@ibz.eu – www.eucpn.org

¹ Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Germany, Spain, Hungary, Luxembourg, Slovakia and Slovenia

Recommendation paper predictive policing

Introduction

Big data is a hot topic in the criminological field. It provides for a lot of possibilities and new approaches are being developed. Predictive policing is such a new big data approach. It goes further than Intelligence Led Policing, which has been on the security agenda since the The Hague Programme. Where Intelligence Led Policing uses data to steer, analyze and act in real-time, predictive policing uses this data and other indicators to calculate the probability of where a crime is most likely going to happen in the future.

Through this paper we will give some insights into the approach of predictive policing by first explaining what it means, then we will have a look at what is happening in the different Member States in relation to predictive policing. And finally we will formulate 12 recommendations for policy makers at the local, national and European level about the approach; how to start with it, what to choose and how it should be promoted. We gathered this information by looking at the literature, by developing a questionnaire which was sent to all Member States of the EUCPN² and by organizing a meeting with experts where the different recommendations were discussed.

What is predictive policing?!

When we refer to predictive policing we actually refer to predictive analysis that is used by the police. Predictive analysis uses data from the past to make predictions on the location and time of future acts. The purpose of predictive analysis is to anticipate to what could happen in the future by using the means and staff more efficiently. When projecting this on the police, this means using the available criminal data to predict where and when there is a heightened risk of criminal incidents taking place. With this knowledge police officers and means can then be used proactively at the locations to prevent and fight crimes. By using this approach, the time-pressed police can prevent crimes more efficiently.

There are 3 different kinds of predictive analysis which can be used in criminological research: the prediction of offenders (mainly focused on the risk of recidivism), the prediction of victims (mainly focused on target groups) and the prediction of time and place where there is a heightened risk for a criminal act. This paper mainly refers to the third kind of predictive analysis. Nevertheless recommendation 9 touches upon the other kinds slightly.

Predictive analysis does not allow you to explain criminological phenomena, it is rather an ad hoc approach within the fight and prevention of crime. It will always need to be accompanied by other policy strategies, the innovative aspect is that **predictive policing allows the police to anticipate to crimes via empirically gained information**. This approach implies the acceptance of the theories that pose that criminal incidents do not happen randomly; that there are predictable patterns to be found³.

² All EU Member States are part of the EUCPN except the UK; they opted-out in December 2014.

³ These theories refer mainly to contextual factors which are related to the time and place of criminal incidents

Predictive policing is using complex statistical models on the basis of machine learning⁴, which produce maps, based on spatial units such as grids which have been placed over the city, showing the areas and times where a crime is most likely to occur. An example is in place to make this better understandable: the application CAS, applied by the Dutch police, gives a prediction of the most probable crimes for the next 2 weeks for squares of 125 m by 125 m in the city and it does this for every 4 hours.

This implies that predictive policing is a method which is based on computer applications. In practice, there are multiple of these applications. There are big commercial applications of which the two most known are PredPol and Precobs and there are some 'home-made' applications of which CAS from the Netherlands is the furthest developed. One of the basic differences is that the commercial software focuses on the data of 3 indicators: time, place and type of offence⁵; CAS, on the other hand, uses up to 200 indicators with a variety of importance to them. More about the differences can be read in recommendation 3.

In order for predictive policing to be possible, a large volume of data is needed. Therefore the approach is mostly used for high impact crimes and high volume crimes since these happen often enough to provide the computer with data, they are registered most often by the citizens and it is relatively easy to pinpoint time and place of these crimes. This means a focus on domestic burglary, robbery, theft, pick-pocketing, violence, car-theft, bicycle-theft etc.

This approach has first been developed in the United States and is now getting introduced in a number of EU Member States. Therefore it seems appropriate to have a look at what is already happening in the different Member States, before we give some recommendations about the use, the promotion and the effects.

What is happening in the Member States?

By looking at the literature and by analyzing the survey, we learned that there are already a number of Member States who are implementing predictive policing: The Netherlands, the UK, Germany (5 federal states), Austria (pilot project) and Belgium (pilot project). Furthermore, and this is especially interesting in light of this paper, 3 Member States⁶ indicated in the survey that they had interest in the methodology and/or would like to start with it in the near future. When we asked about Intelligence Led Policing (hereafter ILP), 9 out of the 12 Member States who answered to the survey indicated that they were already using ILP or were starting with it. This is interesting to know in regards to recommendation 7 where we argue that ILP can be a stepping stone towards predictive policing.

In regards to data collection, the MS stated that the recording of data is mandatory for all crimes. Furthermore, even though there are differences in indicators, there are also some which are recorded in all MS; such as location, time, type of crime and modus operandi. As stated above these indicators are the most important when looking at predictive policing. In

⁴ Machine learning is not applied in every case, it depends on the definition. However, here we will use this term in order to explain the approach.

⁵ More indicators can be added to the commercial software however the companies behind the software will calculate these changes into the price of the application.

⁶ Spain, Denmark and Sweden

regards to quality checks of the data it must be said that there are a lot of differences between MS and some are more thorough than others. Therefore recommendation 11 about data necessities was added.

When we look at the usage of these data, it can be stated that all MS use them for statistical purposes and that most police zones are allowed to access the data. However in some MS only summaries or analysis of the data is given to the local police. Furthermore, sometimes only the officers who need the data for their work receive it. When predictive policing is implemented, the access to data is of vital importance. Nevertheless, not all police officers need the access to this data, local police officers only need to receive the maps and instructions from the application.

When asking about the top delicts for which ILP is used burglaries was mentioned the most, however here it must be stated that, even though burglary was mentioned the most, predictive policing can be used for other types of crime as well. Burglary is followed by drug-related crimes and by theft and robbery (if you assume that they are synonyms). Which correlates largely to the above mentioned high impact crimes.

By looking at the usage of ILP and predictive policing in the different Member States some questions were developed which needed a more indepth answer. Therefore an expert meeting was organized to get some insights into the matter. With the answers of these experts and through the discussions between them, 12 recommendations were formulated to the European, national and local policy makers.

12 Recommendations:

After this short introduction into predictive policing, we are formulating 12 recommendations for all policy makers who are interested in the methodology. Some recommendations focus on how to start with the approach, others on how information should be centralized etc.

Recommendation 1: Do not discuss too much about which software you will use, it is getting the local police on board which is the hard part

The process of implementation is extremely important; during the expert meeting, this recommendation was stressed the most by the participants. Our experts stated that it is even more work than developing the software, which is generally seen as the obstacle to start with predictive policing especially because the framework conditions and the user-friendliness and compatibility with the existing systems need to be taken into account. The implementation has to be included in the considerations right from the beginning. In this context, the implementation includes both the police infrastructure and the police workflows including the acceptance by the management levels.

First of all, the police zones need to be made receptive to the idea of predictive policing through presentations and information sessions. Especially senior police officers need to understand the theories and reasons behind the methodology (see recommendation 2 about theory). When they see the benefits of the system and they understand it, they will be more inclined to implement it correctly.

Secondly the correct implementation of predictive policing is a delicate task, when the police does not use it in the designed manner, the effects will diminish. Therefore the implementation needs to be monitored throughout the process; the main investment of

predictive policing needs to be on the organization who is implementing it. The organizations need continuous coaching in order for them to use the information managing system correctly. One of the ways to do this is by not giving out the maps the system makes unless the police zone follows all the steps and rules. Each key player in the implementation of predictive policing needs to get correct information about their tasks and about the rules which are attached to these tasks. When these rules are followed, a correct implementation is more likely.

Finally, it is very important to focus on the whole system, not just the maps which the police officers receive. Attention has to go to the control of the predictions; how do the police officers get these maps, what do they do with it, how is it processed, what are the consequences, who is involved etc. Everything needs to be followed in order for it to continue to work well. It is not enough to give the police this tool, there needs to be a follow-up. Even when the police is using the application already for quite a while, checklists still need to be filled in, in order to make sure that they keep using the application in a correct way.

Recommendation 2: theory behind practices needs to be known

It is important to convey the subject on an objective level and to avoid misinterpretation in order to achieve acceptance both at the management and the immediate implementation levels. This includes explaining the theories behind the application. Police officers have a lot of experiences and when they are asked to perform an analysis they can do this through their experience. However they do not always have the theory behind them in mind⁷. For example, near-repeat theory is often not known as a theory but rather as an experience after years of police work. Nevertheless senior police officers and decision makers need to know the theories behind the practices in order for them to understand it better. Especially because predictive policing builds further into these theories and when an approach or a method, like predictive policing, is promoted, this becomes an issue.

Therefore our experts stated that when a Member State wants to start with predictive policing, they will first need to invest more in the education of their senior police officers. In this regard it is not enough for a politician to state that the police should use predictive policing, it needs to be carried by the police officers themselves, they need to believe in it or be convinced about the merits of the approach. An important aspect of this, is informing the senior police officer that this methodology is not something like in the movie 'The Minority report'. Especially because a senior police officer can damage the topic for years by one single sentence and by not being open-minded to it. If only the analysts understand the method, then this could lead to the wrong implementation of the method or the misinterpretation of the results. Furthermore, it could manifest in reluctance by the police officers to implement the new methodology. All stakeholders in the organization need to understand what is happening.

Also, predictive policing, and even more generally ILP, should be more incorporated into the basic training of the police. Even though the The Hague program stated this about ILP years

⁷ According to our experts, this is not only a problem when looking at predictive policing. In general it can be stated that police officers, and especially senior police officers, do not have enough information about the theories behind the practices.

ago, this is still hardly the case⁸. Obviously the need to incorporate this in the basic training of the police depends on the usage of the approach in each Member State. Furthermore, as recommendation 11 states, the approach can only be used when there is enough qualitative and quantitative data to work with.

Recommendation 3: drafting of the own software might be better than simply buying the commercial one

When a Member State, region or city would like to start with predictive policing, they will need to think about which software and algorithm they want to use. As stated above, there are two main options here: commercial, ready to use, software or developing own software. In the beginning the commercial software packages seem more efficient and budgetary friendly: everything is already in place when the package is bought, it is ready to use and it looks good. Furthermore, developing a new software package with a workable algorithm can be rather expensive because of staff costs, possible academic research, analyzing criminological theories and practices etc. However, people in different police forces have done this already and there might be a chance of knowledge exchange instead of starting all over again (recommendation 4 argues for a guidebook about predictive policing).

Furthermore, in the long run, developing your own software or using a non-commercial one is more cost efficient. Adjustments to the software can be done far more easily than in the commercial software; where each change has financial implications. Also, when the own software is developed it can be used without great costs, the commercial software asks each year a fee for the usage of the system. Additionally, custom made software and applications can be adjusted to the local situations within the same software and you can keep developing your system. For example in the Netherlands they have experienced that, for making predictions of different kinds of crime, you can use the same algorithm, but you will have to use different sets of data. Also, in Antwerp they discovered that the predictions were more precise when they differed between day and night. This kind of knowledge is easier attained when you have developed your own software and can experiment with it.

Also, when using a commercial tool, you are dependent on the market. You buy a kind of 'black box' in which you do not know exactly what is happening with your data, you do not know how the algorithm works and therefore which aspects are behind the predictions. It is rather a 'quick and dirty' solution to the pressure of starting with the method due to more political than policing aspects. When an own software is developed, this takes more time but in the end the police forces and analysts will understand better what the methodology is about and will have insight in the theories behind it.

Therefore, with the available knowledge we have so far, we would advocate the creation of an own application or adjusting an existing non-commercial tool instead of commercial software. Here it is also necessary to state that there are now already multiple commercial tools on the market which has as a consequence that their marketing strategies are becoming more aggressive, especially smaller communities should be warned about this.

⁸ Only 8 of the 11 Member States that responded to the survey stated that they were already implementing or starting with implementing ILP.

Recommendation 4: Uniform standards for predictive policing approaches should be formulated by the EU Commission

For the moment the Netherlands is quite far in the development of their software. In Germany there are multiple states which has configured a commercial tool to meet their needs and the regions with pilot projects has recently been increased with Austria and Belgium which are looking into the development and testing of a new tool. By now, we should be able to recommend one or two running systems, which can be adapted to local situations. It does not make sense to keep developing new systems. In the end you will have too many systems and there is the possibility that the results will not be comparable between cities which use different systems.

Consequently, it needs to be stated that it would be beneficiary if, out of the experiences from the current self-developed systems, a few uniform standards are deducted in order to create a general application (the manner in which you show the maps etc.). This application can then be used by all Member States, regions or cities who want to start with predictive policing. Each application will always have to be adjusted to the local characteristics: the building elements of the predictions are to be determined local. Nevertheless, taking away the need to create an application is already a huge improvement when a city would like to start using predictive policing; it saves money and time and it decreases the boundaries for Member States who want to start experimenting with the approach.

Therefore it would make sense to describe uniform standards for instance in a guidebook. It is important to formulate framework conditions that need to be taken into account when applying the predictive policing approach, such as availability and quality of data, acceptance, adjustment to regional conditions as well as the police IT architecture, the spatial structure, consideration of data protection provisions etc. Furthermore, the guidebook should give information about the limitations for the implementation of measures following a prediction (crime suppression, prevention, number of staff) as well as modifications due to identified changes in perpetrator behaviour. This guidebook needs to explain the different steps to the Member States, regions and cities which will make it easier to start using the approach. Also, the guidebook should stress the importance of assessments of the predictions by appropriately qualified police officers/analysts.

Recommendation 5: exchange of information and software developments within an expert network

It is clear from the past two recommendations that there are some Member States, regions and international contacts that already have gained a lot of experience with predictive policing. Our experts therefore advocated the creation of an expert network in which all interested partners can come together and learn from each other and, possibly in the future, work together.

In April 2016 there was a conference about Domestic Burglary at Europol; predictive policing was also on the agenda. However it was not the main focus of the conference. We would recommend that this kind of conference/expert meeting is organized again with a clear focus on predictive policing. There needs to be a mix of project leaders, data miners, policy makers, academics etc. From there it might be possible to create a platform for experts to exchange information and to ask each other questions, this will be especially beneficiary for practitioners who want to start with predictive policing.

Recommendation 6: Academic research should be supported to investigate the effects

So far, it seems that too little research has been directed to a thorough examination of the results and effects of predictive policing. Academics are often associated with the development of the software modules and the algorithms. Furthermore there has been quite some academic literature written about the methodology, especially in the US. However there is a gap in empirical studies which focus on the effects at hand. It is important to accompany the application of predictive policing with academic research in order to assess if the approach in question is appropriate and effective in principle, and to identify problems and make necessary adjustments. Also more studies are needed into the difference between crime types and type of predictions. Furthermore, existing information needs to be better disseminated; some of Europe's police forces conducted bachelor and master studies on the topic, others applied for funded research projects with academic and industrial partners.

In recent months there was a publication of an academic study in LA which investigated if the software could better predict crime than the experienced analyzer. This study showed a positive correlation, therefore it can be stated that the computer program indeed helped the police to get information about future crimes. Nevertheless, one study is not enough and the context of European police zones is different from the ones in the US.

Additionally, it was stated by the experts that it is difficult to measure the effects of predictive policing because it depends on so many variables (if the information reached the police officer in time, if the police officer had time to go to the spot etc). Field experiments are needed; there is a large gap in Europe about this, there is some information about the US, however there the cities are much larger than in Europe. Therefore we would highly recommend a study being support by the EU Commission to research the effects on the short and long term of predictive policing in different European cities and neighborhoods. However this study will need to take into account that there are different framework conditions in the various Member States. The aspects that could be considered include, for instance, the "lack of reference areas", differences in the data available, different theoretical and methodological foundations, legal requirements and heterogeneous software solutions.

Recommendations 7: start with Intelligence Led Policing

Predictive policing should be seen as the logical, following step after intelligence led policing. ILP means the sharing and use of information and observations to steer, analyze and act in real-time. Hot spot maps are one of the products of ILP, these maps show where there was an increase in crime in the last set of hours/days/weeks, and these hotspots can then be awarded extra attention of the police. Predictive policing uses the same kind of data however by adding this data to an algorithm, it is possible to not just show where the past crimes have happened but to predict where the future crimes are most likely to happen. Everybody involved must be clear about the fact, that prediction is always based on probability, not on proven facts. When the police are already used of working with ILP, it might be easier to get them on board with predictive policing (see recommendation 1 for more information on the importance of this).

Recommendation 8: Predictive policing is an approach not an end

It is very important to clearly state that predictive policing cannot and will not replace the experience of the police officer. It is rather an extra tool that the officer and his hierarchy can

use and not the end action. In the US, it seems they rely on the 'machine' too much. So far in Europe this has not been the case. Predictions are never 100% correct and it will never be possible to go to a system in which everything that can happen will show up on the maps. Furthermore, it is absolutely essential that you combine the machine made predictions with the experience of the police in a way, that the 'human factor' has the option to make the last decision.

It can also be mentioned here, that in the future it might be possible to go to a prescriptive policing. Prescriptive policing would mean that when a prediction is done about a certain crime in a certain neighborhood, the software would also suggest a certain measure which will have the highest effect to prevent the crime which is predicted ('real-time technology'). For example, patrolling, going for a coffee in the street, sending a WhatsApp to the neighbourhood watches... Here again, even though a suggestion about a possible measure would be given, it will always stay up to the police to decide what exactly they will do. The experience of the police officers will stay important to correctly assess the situation on the terrain. Nevertheless, no Member States is far enough with the implementation of predictive policing to start with prescriptive policing. We are mentioning it here rather as information on the perspectives of this approach.

Recommendation 9: no legislative difficulties as long as you stay away from individuals

Depending on the Member States the implications of predictive policing on legislation might be different, however generally speaking predictive policing has no problems with legislation as long as the method stays away from people and as long as the own data of the police is used. The data⁹ also needs to be 'anonymized', in order for the data not to be tracked back to the persons. Nevertheless as recommendation 12 states, other data is sometimes used; there it is important to get some contracts about the use of that data.

So far in Europe, predictive policing is mainly focused on the prediction of crimes. However it is also possible to use predictive policing to perform predictions on victims and offenders. Nevertheless, here the privacy rules are far more complicated and delicate; and in some Member States these kinds of applications will be impossible to implement. Still in the Netherlands, the police has a project together with social services in which they search for indicators such as violent neighborhoods and then go and talk to the children to keep them on the 'straight path'. Furthermore it could also be interesting to combine the personal information on the location of suspects with the application; this could be done through GPS tracking of phones. However this is not yet allowed in Europe and multiple Member States will have a problem with it. Still, since this is a general recommendation paper, we are mentioning it as a future possibility.

Recommendation 10: start with concentrating on urban areas

In order for predictive policing to work and be worth the effort, a large amount of data is needed and the available police officers need to have the possibility to act upon the predictions. Therefore, we would recommend starting with predictive policing in urban areas. Cities usually have the highest amount of data because of the volume of their population and the crimes. Furthermore, the police zones of cities usually have a larger amount of officers in

⁹ In Germany the use of individual-related / personal data is not allowed in this context.

order for them to be slightly more flexible to redirect certain officers according to the predictions.

This does not mean that predictive policing has no merits in rural areas however this needs to be more investigated; it is more difficult to obtain enough data to do calculations of probabilities, therefore it could turn out that too many predictions are made which is not workable for the police. The research which is available is mostly from the US where the cities are much larger than in Europe. Nevertheless it needs to be noted that the cities in the US, are larger, but their police corps are smaller in comparison to the European cities and their police. Therefore in the US, the officers go to a risk area much shorter than in Europe, where they go and have a talk to the citizens. In the US they just show up and maybe drink a coffee, are visible in the block and then leave again. Therefore in areas which are pressed for police officers, it could be useful to test the 'American way'.

Recommendation 11: data needs to keep improving and quality has to be checked

Obviously, data is very important when looking at predictive policing. The higher the quality of the data, the more reliable are the calculations of the probabilities. During the pilot project of Antwerp, data checks were performed and it turned out that the data of for example domestic burglary is the best when you look at location, however it scores poorly when looking at the registration of the exact time the burglary happened. This is important to realize when analyzing the data and adding it to the system of predictive policing. Furthermore, in general it needs to be stated that when using predictive policing, you should focus on high-volume crimes because these produce enough data which are needed for the predictions.

Each application uses different data indicators. In the US they mainly use 3 indicators: time, location and type of crime, while in the Netherlands they use almost 200 indicators. The police are not the only source of this data (see recommendation 12). Furthermore, it is possible to select some indicators and to weigh them according to the type of crime. In order to be able to do this, a lot of research has to go into the main indicators according to crime and the quality of all this data.

Nevertheless location, time and type of crime need to be seen as the base of each predictive approach. Therefore, we would suggest to focus on improving the quality of these types of data first. A remedy here could be to adjust the software of the police report; when an officer then makes a report on a new incident it can for example only be saved when the police officer has filled in a correct address and time. It could also be useful to use the cell phones of the officers to geolocate the place of the incident. This could lead to a higher quality of data for the most important indicators.

Recommendation 12: information exchange between the police and the administration needed

Most data used by predictive policing goes back to the data of the police. However, data from the fire department, population administration, welfare etc. can also be interesting to get more information about the characteristics of the terrain, if data protection allows their use. It is a multidisciplinary perspective, it can go further than just criminality; some risk for a certain

neighborhood can be discovered by looking at the data, nuisance etc. This can then in turn be interesting for the police. The maps can be made richer by local data. Each department who holds this kind of data has a different set of rules about them. Therefore in order for this data to be used by the police, there needs to become a kind of understanding and mutual trust between the actors.

There are also data which can be registered as crime opportunity data, for example the presence of bars, shops, older houses with less prevention tools etc. These kinds of data have an influence on the risk areas and should therefore be taken into account. Going to this might need a step-to-step model at least in those Member States with strict data protection regulations.

Additionally, not only the administration has interesting data for the predictive policing approach but also the citizens can provide the police with data. In Poland they created a good practice called National Map of Security Threats. The practice allows citizens to use maps to mark activities which happened and which can cause threats or problems. These social activities can lead to a completion of police data by information directly obtained of the citizens. However, education and encouraging inhabitants to become active is an important step here. The merits of this system can be especially high when looking at crimes which have a high dark number, it will allow to get a better image of these crimes.

Furthermore, in the same line as the sharing of information between law enforcement and administration, there is also the possibility to share information with the private security firms ofcourse with consideration of privacy issues. We are not passing that they should get complete access to the system and the data but rather that they could also benefit from the maps which are produced by the software. They could use these maps to redirect their patrol routes around business areas.

Provisional conclusions

These 12 recommendations should not be seen as a fixed static whole. The idea was to give a kind of starting point to discuss this topic and to formulate what has been learned so far. We did this by giving some practical information and some organizational suggestions. We hope that it is obvious from the recommendations that this could be a promising approach however more research into the topic is needed and more 'centralized' actions should be taken. When more research and practices are available it is very well possible that these recommendations will change. However for the moment we would suggest that the Member States start with these.

Selective bibliography

Bachner (J.), *Predictive Policing: preventing Crime with Data and Analytics*, IBM Center for the business of government, 2013

Hardyns (W.) and Rummens (A.), *Predictive policing as a tool for crime prediction and prevention*, IRCP in order of Antwerp Local Police Service, 2016¹⁰

Perry (W.), McInnis (B.), Price (C.) et al., *Predictive Policing: the role of crime forecasting in law enforcement operations*, Rand Corporation, 2013

Ratcliffe (J.), Taylor (R.) and Perenzin (A.), *Predictive modeling combining short and long-term crime risk potential: final report*, Temple University: Center for security and crime science, 2016

Rienks (R.), *Predictive policing: kansen voor een veiligere toekomst*, In: politieacademie – lectoraat intelligence, 2015

Smit (S.), de Vries (A.), van der Kleij (R.) et al., *Van predictive naar prescriptive policing: verder dan vakjes voorspellen*, TNO innovation for life, April 2016

¹⁰ Not yet publically available