

2026-02

þÿ › ± , Á µ ¼ À Ì Á ¹ ¿ : £ Í ³ Ç Á ¿ ½ µ Â œ - ,

. ." Œ 0! 0\$ &

0!	%.....	iv
1.	ü 1. &.....	1
	.! #1 .1 ! ..2....."	1
	2)\$ " û Œ & .2 .."ü!...1....."	2
	ú.1 0!&2.....2.....	3
	ù . .)2 2. . 1Œ #/.)2 2. 2 " û Œ...&...2....."ü!..4 1 ."	
	üŒ 1)Œ 1 0.../....."	4
2.	! 1)" . / .12 10 " . !0..Œ..!...#.....	6
2.1	! 1)" ü 2 # . !0..Œ..!...#.....	6
	û ! 1 .Œ) 0" !3 "*.0.....2..".....	6
	\$ 1 0 3 ! / .3# ! . & . / .3...!.....	7
	*Œ .2 ! 0" . !0..Œ..!...#.....	9
	2!. 1# Œ 0 0" " ..&.....".....Œ.....12 "	
3.	û " . \$. 1 2 # . !0..Œ..!...#.....	15
	û ! &1 . / 0 .2 ...+.../...2*&.....	15
	\$ 10 " . !0 Œ ! # 0 2 ! ...&.....	16
) " 0Œ \$ 0 ! 10& 20 & 0 & ...!..2...+.....0..2..#17+	
	û ./! " . 0 / 0" .Œ) !#%...!.....!0..Œ..!...#18	
4.) . ,01) . 1 ù 2 0 2+Œ 1...".....!0..Œ..!19#	

ü	..0.1.....	19
4.2	ü#!&œ.') 01)...œ.....1.....	20
û	0 " / . . 1.#.....1.0..."	22
0	œ! 10 " . . 2 ! #) 0..0".....!.../...)2..2.0".....	23
"	œ! 10 10 " 12. œ . 1 . 2...#.....!0...œ...!.....#	25
"	üœ œ 2+10 " . ! 1/ ! 1)")12..#.."25 # . !0	25
ü	2 1 . 20 œ 1 1 # 12 . 1.....2...#27 . !0 œ	27
!)	" 2 " 0 .2 " 12 " 12 œ 1 2 œ 1	29
. !0	œ !...#.....	29
)	12 " œ!) % " 20\$œ...!0.....1.0..."	30
6.	0\$ " *ü! œ "œ 1 * . . 2.12 " 2 #!0...œ ! #	31
6.1	0\$ 2 1*, Big Data . Predictive Analytics.....	31
6.2	Blockchain . \$.1)2 2. . #1 / ." .0.3.../.....1...*.....	33
6.3	12 . 0 0 2 forensic analytics).....	34
6.4	#12 .2. œ!. * 1 " logistics..\$.#.....	34
ü	œ \$0 ! 1 . û . \$0 ! 1 . "....." !.....2.....	35
#	0! .1 . 20 & 0 & 0 0 2 + .!\$.+.....1.2.#35 ."	35
0	& 0 . " / ./ .1 0".....0.\$.....	37
ü	1&20! 0 \$ 10 0œ \$0 ! 10*.....#1.../0".....0.38/ .1	38
!	2 ù #1 ! 2 10 " 2 "ù.2...0.2+.œ...140"	40
!	2 ù ...#1.....	40
!	2 10 " 0..2..&.1..."	41

# OE 0! 1 ...2.....	44
ú !.3 " ù ..3.1".....	47

1. ü 1. &

.! #1 .1 ! .2 "

p #OE !\$ #1. !.3 . *!& .OE) 2 3.) 0 2 # .!0 OE
 2 / .! + " 0 0 11) 0 3*1 2 # . 2 . . OE *OE 0#!
 / 0 0 " ! . 1)OE & " 1& 2UNODC Europol
 INTERPOL . + " .OECD OE! 13 ! # 20 ! & 0" 0 10 "
 !3 " 2 #" \$. 1 * " . 2 " 0OE OE2+10 " 2 # .!0 OE !
 .! . ! . 1)OE&AF . FRONTEX . . * # 1# 0 ! 0"
 OE 0! OE2+10 ")OE & " 2 .!0 OE)! .#1 & .OE + .
 ü#!+OE . ./0 * 2." 2 " / .1# ! . " / ./! " . 2 " 20 & 0
 ùOE) 2 0 .2 . 12 OE! 1 1 .3OE 12
 0 1& .2+ 0 0 20" *!& .OE) 2 . #1 \$! .2 ! +
 0 .2 * 0 forensics auditing . 2 .OE # % OE.! & 1# .
 (Wells Singleton & Singleton 0 20" .#2 " /0 \$ # 2 \$! 1
 0 .2 " 12 " 12 . . +! 1 OE! 2*OE& .OE 2 " OE #
 .!0 OE)!
 2 0 !.3 . 3 !0 ")OE & " 2 ÿ úü 2 ü-ÿ .
 . 20 # . 0OE 12 # \$ # . ./0 0 2 2.1 2 " OE!.
 2 " .OE+ 30 !0" + 01)/& .OE) 2 OE!.0 OE)! p ü ù . 2
 / 1 0*10 OE ! 1 .2. 0OE \$0 ! 1 . " /! 1 " 0 + . 0 !2 20"
 OE! 13 ! # 12.2 12 /0/ . . 0! . 0 . 0 2 OE 1 *
 /!.12 !)2 2."

2 0 OE!)2.2. 1* 3& . 0 0 20" 2 # ÿ úü . 2 "
 (2020± 2 .!0 OE)! .#1 & . .OE + OE! ') 2& .OE
 OE!) . 0 1 . 2 " .OE+ 0 0" . 2. /)1 . 1 / . . 2 # 0
 0 !.3 . 012 02 #D&") OE . 1 12 " ./# .
 \$. 1 + 0 \$ # . 12 . 0 1\$#1 " 2 # / .1# ! . * 1#
 " . OE0/ . 0 2 ")OE & " 2 12.2!0#OE)! & OE!ES,
 OE!.OE & OE! ') 2& blockchain! 1. 2 0 2 OE 1) . ./0 * #
 1 .1 . / 0OE 12 + 0)/& OE! 1 1 " 2 # 3. #
 OE!. 0 !0#12) .OE. 2+ 2." 1* OE!. 12+ +0 . .2)
 20\$) &

2)\$ " û œ & .2 " ü! .1 ."

p œ.! *1. / œ 80!.21 \$0 &" 1 œ) 2 / 0!0* 1 2 # 3.
. !0 œ ! # #œ) 2 œ! 1 . 2& 1* \$! & 0 0 0& 12 . \$
.œ 2! œ 2 # . +" . 2 . /0 20\$ + +
0! . 0 & œ # /* . 2. # 1#œ 20201 12 . 2 œ.! 01 2 #
. !0 œ)! .œ 20 0 . 1 .! .œ0 . 2 . 2 /)
)2 2. 2& 0 œ ! + /!.12 ! 2 2& 0 + 1#\$ 1# / 02. 0
. / .3 ! p 0 2 .œ 1 œ0 12 .2 /0+ œœ 20+010 \$ #
+ 0! . 0 & . 20\$ + *10& . 2 .2.œ 1 2
.œ+20! " 12)\$ " 2 " 0! .1 ." 0 . .œ! 20 0 . !&
0 3.1 12 0 .2 12 . 12. / 0 1# 0! .

0œ ! #" 12)\$ œ0! . #
0&! 2 œ! 1 1 2 # . !0 œ ! # &" œ #1* 0.
" 0 .2 " " / .12 10 " . #1 2
* . 01 * œ . 1 # 10 0) 0#0&œœ0/ . 0 0 œ)
. /0 2& 1\$#!+ . ./ * . & 1 0 & 2 #
.œ 2*œ&1 .2. !.3 . 2.) 1 2& .1
. !0 œ ! # .*1 . .œ .! &2)œ . œ 0# .2 /
. . œ . #1 2& 22#)!œ&" 2& # & 2&
0œ 1)œ 1 . 0 2 / 0 + . 0 + 0)/&
œ!. 2 + 0 2 œ 1 * 0 \$ # . .2.12 " 2 # 3. #
0 \$ 20\$ 2 1* / !#3 ! blockchain risk profiling
œ.! #1 .1 œ! & 20\$ + *10& . 0)/
. .œ 2! œ " 2 " .œ 2 " œ # .3 ! 2 . !0 œ)!
0 1& 2&1 2& 0! . 0 & 2 " 0 .2 "
. \$ 0#1 2 # 3. #
.2. !.3 2& + 01. œ 2 + œ! 10&
/ .2*œ&1 1# 0 ! & œ! 2 10& 0 2 &1 " . œ
.1 1 0" 10 / 0 0 " . " œ!. 2 " . 2) 0" œ! 10
0 1\$#1 2 " / .3 0 ." . 2 " .œ 20 01 .2)2 2.1' +2& 0
œ 2 " . 2 0) 01) œ0!

ú.1 0!&2 .2.

p 0) & / OE & .2 / .2! 012 0 12 OE #OE!.
. !0 OE ! # . 2 " OE.! " / . 1 " . . + 0 02 2." 2.#.
20\$ *" . 0OE \$0 ! 1 . *" OE.! 20" OE # 0OE !0 # 2
2& 2!& OE 12 * . .OE 2! OE " 0 p.0! .1 . !.3 . .1)OE
OE #OE / + 00 02 10 2 2 . 1# . . .OE 2#OE+10 .
1\$02 0 2 3.) 0 2 # . !0 OE ! # . 2 " 0)/ # " 0 2 OE 1
2 # ü /0 2 0!&2 .2. 0 .

• . 0 . 2. .1 \$!. 2 ! 12 2& #!)20!& !3+
OE . 2. 1. /! 1 " 2& 0 .2 + / 2*&

• 0 . 2) . 01) OE . 1 OE # / OE 0 2 OE!
2 # . !0 OE ! # 0" 0 0" 2 #/#0.1 * OE . 1 # 12
. OE . 2. 0 03.! " 2& #3 12 0 & OE 2 +

• 0" 0 . 0 0 %0 " OE! 10 " 12 03.! 2&
)1 . 10 / . !.2) 0OE OE 0/

• 0" 20\$ 0" . \$ " 20\$ big data, blockchain, drone\$
\$! 1 OE * 2. 1 0!. 12 0 2 OE 1) . 2 .OE 2! OE
& 2&

• +" 1# 0 0 .2 12 12 0 2 OE 1
\$! .2 + 1# . . + . 2 \$!.2 ! 3 1 OE!.
03. . &

• "0 . !) " 2 " / 0 *" INTERPOL, OLAF, FRONTEX .
2& 20 & 0 . + #OE !01 + .12# + . / . !.2 +
.2.OE 1 2 # 3. #

• 0" OE! 2 10 " OE 2 " . . 2) 0" OE! 10 10 "
0 1\$*1 # 2 OE!) 2% .2.12 2 # . !0 OE ! # 12 0
0#!&OE.') 0OE OE 0/

. 0!&2 .2. .#2 / * 2 OE . 1 . #1 " 2 " / .2! "
OE#! . 2 " 0!0# 2 " 12!.2 " p .OE 2 1 12. OE!.OE & 0
12 12 .2. #) 3. 2 # . 12 OE!)2.1 12 \$0# & OE
. 2 .OE 20 01 .2 2 # . 2 02+OE 1

ù . .)2 2. . 1OE #/.)2 2. 2 " ù OE & .2 " ü! .1 ."
. !0 OE)! .OE 20 0 . / .\$! . OE. 1 &" / ./.
* 0 .2 ".!0" 10 OE OE 2+10 " 12 /)1 . / 1 2
2 & . / .12 10 " 2 # 0 20 2. .OE) 2 .OE+ 0 . 3 !
#OE) 0#1 2 #) # 0 OE ! # \$! 2 \$! .2 /)2 1 ! . &
/ 2*& . 2 / .3 ! !022 #! + ü /)20!. . 2 ü /.
0& !.3 " 2 " 1 " .OE 20 0 OE* 0 1)/ # . / . 02.) 1 "
. . +)OE&" .OE .*1 . . *\$. .! &2 . OE! ') 2.
p . . . !.3OE! 1 1# 2. # 10 / 0OE 12
0OE OE 0/ OE # . 1# /# 0 " 20\$ " . 0OE \$0 !
/ . 20\$!! . 1 20\$ " 0 0 0 ")OE&" 200\$kh2in 2. 1*
big dataanalytics . 2. 0&\$&! 0!! 0 .. OE# # #1 .12 12
0 1\$#1 2 " / .3 0 ." . 2 " OE!) % " p 1# 2 " 0 .2
&" 0! . 0 .OE #% " *OE OE 2& ! + 03. . & . \$! .2
0 . ! 1 üOE OE . . .)!3&OE " 1." 2OE# .01 *
OE . 1 # 2)1 10 0))1 . 10 0#!&OE.') 0OE OE 0/ .OE 2
. 2 0OE 2#\$. 2 02+OE 1 2 # 3. #
p OE.! *1. / .2! 0OE1\$0 !00 . 0 . 1# 0) .
/ .12 10 " 2 # . !OE OE1B !# 2." 0OE 12 20 ! & 0" OE!
/* . 2. . #OE 12 ! # 2 .OE 20 01 .2 \$! . /)1 ." OE
. !0 OE ! # p 1OE #/.)2 2. 2 " / .2! " 0 2. 0OE 1 " 12
OE! 13 !0 OE!. 2 . . 10!0 ")1)OE#&"3 20 & 0 . " . .12#
" #OE !01 0" . 02 3 !0 " 1& 2 " / .
OE 2 " . 03.! 1 & *10& . 2 0 1\$#1 2 " / .3 0 .
2 " .OE / 2)2 2." 2& 0 \$&
" 10 . 0OE \$ OE # OE!. . 1# / 02. 120 0
/ .3 ! . 2 #OE) 0#1 2& !.2 + 01)/& 1# 2 " /
& OE 2 / 12.1 03)1 1# 0 12 #OE 0! 1OE 1
" 0OE \$20)2 .2." . 2 " & " / . 1 "

üOE 1)OE 1 0 / ."

p 0 2 3 / 10# /!. 0 12 0OE 12 . .)OE 2.0 10
1 0 . .3 ! " . OE 0!. 2 !& !0# . . OE 2 /! 1 12 2
2 # . !0 OE-!OE#! # 0 OE ! # p 0 / OE! 1 1 2 "

/ .2! " Œ0! . 0 0 202. !.3 . 02
. .3 ! 10 0 " . / 0 0 " Œ " *# 20 ũ Œ 12 . . !!.
0 20" . 0 10 " / 0 + ! . INTERPOL, FRONTEX, EUROPOL,
WCO 0 0 . 01 ." . . 1 + 0) 0#!&Œ.'
1# 10 " . +" . /0#20! 0 /0/ . .Œ) / *)1 3#!"0 ". /
(0 & 0 . û ü ù

2. ! 1)" . / .12 10 " . !0 OE ! #
2.1 ! 1)" ü 2 # . !0 OE ! #
p . 2 # . !0 OE ! # 12 0 2 /0 OE 0!
.2. /.1 + 3)!& 0 / 0 " 0 OE OE 0 / 0 OE 1 . 0)2
«2 . !0 OE)! OE 0! . 0 0 OE.! / . 1 . . + OE #
.OE 3# !.2 " 0 OE OE 20 ." . 3 ! » p 0 OE . .D* 2100 &0 2. 1
OE!. 2 ")OE &" %0#/ " / &1 OE! 0#1 " 0. " 0
OE!. .1 OE 2 + . # 0 + 0 \$& ù 2 2&" 1* 3
(2018),« .OE 20 0 . OE #/ 12.2 3.) 0 OE # OE! 1 0
2 " / 1 " 2 " . 2 0*!# 0 2»#! .! 2 ")". OE #
0 2012. !! 2 # ü * 0 & 0 . * +/ .
«2 . !0 OE)! &" 0 !3 0 1. & " 0 . & " . . +
20 & 0 . + / .2#OE+10& » .OE12)!0*10OE!. .2)2 2« 2. . 12
/# . 0 0 11) 0 OE/ # 1.\$02 02. 01. 0 2 #OE) 0#1 2
#! .!\$." 2 # ! 2 #" . 2 / .2 !. 2 " . #1 /»" ùy & 1# .
2018).
. !0 OE)! /0 OE 0! ! 02. OE .) 10 3#1 1* !.
0 /)OE &" .*1 . . .OE0 OE 0 20 02. 10 % 3 . OE 0!
darkweb)OE # ! . & . # + .2. / . * 3.! . 0#2 20\$
OE 2 12 . . p 0 2 # 10 . 2# OE /#)1#./#) 0 3#1
. % 3 . 2 .OE. 200" !3 " 0 2 OE 1 *)OE &" .
0 2! + \$ + . / .1# !. " %Interpol, 2022; E#ropd!
0OE+" ! 1)" 2 # . !0 OE ! # OE! OE 0 . OE!
*" / 2 *" 0 .2 *" *." .13. 0' 0" +120
.OE 2#OE & 0 0 OE !)2 2. 2 0*! " . OE #OE)2 2. 2 # 3
0 OE \$
û ! 1 .OE) 0" !3 " * 0 .2 "
p ù/ # 2 0)2 2 . !0 OE)! . . \$0
3 ! / .3# .OE 2 .2 2 # û 1 # / .3 !0 &" OE! " 2 1#\$
2 OE!. .1 / 2 + !# 10& . 2 0# 0 . 0 OE 1
20 & 0 . * . 012+2 " üOE 1 ") & 2 " 3*1 " 2 # OE. ! 0
1#\$ 2. / . *.0 ./ .!\$ 2. / .1# !. . OE + 2."

./# . 0" 0 \$ # p ù/ # . .3 !0)2 Œ!) 0 2. .
Œ # ! 1 02. 12 02. \$ 02. * / 2 " Œ.! .1 " . ! .
0 .2 " Œ . .12 2. .0 0 / 0# 01 . 2 02+Œ 1
)Œ &" 1 0 +Cr#netal 10 . 2 01 0 2 .1 3 !
1#\$ 0 2 Œ 02. 1& 12 + .Œ 10& 2 .!0 Œ)!
. \$ 0#1)2 2.)2. 00 200 0 2." 1# . . " 0 / 01 #" Œ! !
02. !0 Œ"! 0" / " Œ # \$! 1 Œ * 2. 12 .!0 Œ)! 1#
/# .2)2 20" 2& 1# .2 + 0 \$& 0)" Œ # . 12 . .
0 0 / 0# & 0)/& 0 " .2 12 " . 2 .Œ # % 2 #"
0 Œ)! Œ.! .Œ & Œ! ') 2& .Œ)! *\$. . . 01 #
. 0 2! 0 . Œ * Œ 0! 11)20! .Œ) . .Œ Œ.! .1
1& .Œ) 0 .' * 21 2. Œ. 2 %0*!\$0& .!& 2#& ŒŒ#
1#\$ 0 Œ 0! 2. 0 1* !. . 1# / 02. 0 ! . &
0 .) 3 !) . Œ! ') 2. .#2 Œ 22 # 2 Œ 0 #
3 ! * \$&! " 0 \$.13 0 ." . 10 Œ " ŒŒ! Œ 2#- 10 "
p 0 #12)2 2. .#2+ 2& Œ.! & /!.12 ! 2 2& 0 2. 1
12. # % !/ . 0 Œ 0 / . ! /0 \$ 0 2 1 2. # + .2
#" 2!)Œ # " . Œ.! . Œ 2 # 2 # " 0 \$ # " 2 Œ! . 2) :
.Œ 10& /0 0 . .Œ +" Œ.! . .2\$0 . " .2.1! " " 10 .
. #1 / . Œ # 1#\$.2. 0 12 \$! .2 /)2 1 Œ * 1 .!)20
Œ! 0 & ò Œ &" 0 Œ 1 . 0 ù 2 Œ.! .0 Œ)! Œ.! .Œ
&" / .1# /)0 2) " / .3)!& 0 .2 + !3+ 0 / . 20! /
Œ 0 / 2 # ! . & # 0 Œ CD.2 " 0 . 2 01 0 2 0 &
12 .Œ 2 2 0 02 0#1 0)" 1#12 .2 "
0 1& .2+ 0 12 \$0&1 " Œ #0 " /! 1 " . 1# 0\$ Œ! 1
02 " . 20\$ " 1# 0" ù#2 /# . 3*1 2 # .
/#1/ ! 2. 2.)! . 02. * / 2 + Œ.! . 10& . 1 .!+ 0
" 2 " ò Œ &" #Œ Géndronetal Œ.! .Œ 1 12
.!\$0 & . \$! 1 Œ 1 Œ.! & 1#12 2& .2. !.3 " 1#
)Œ # Œ.! . 1# . * Œ 202. Œ 1& .Œ) 2*Œ ") 0" 0 Œ

\$ 1 0 3 ! / .3# ! . & . / .3 !

. !0 Œ)! /0 .Œ 20 0 .Œ +" . 20 & 0 . /
ù 2 2&" 0 1& .2+ 02. ! . 12 " / " 2 " Œ.! . "

0! . 0 #OE) 0#1 " 2 " " / .3 0 ." 2 " 01 " "
& " / . 1* " ùOE 20 0 . .OE) 2 " OE 0OE /#
3 ! / .3# " / .OE0! + 2." 02. 2 !.2) \$. 1) 2 . !
.
2 20 0#2. . 2 " 01 ù 0 !2 2 ù!\$ û 1 &
/0 / 12 0\$.!.. 2 ! 10 2 . !0 OE)! &" . .OE) 2 " OE
3 ! / .3# " 0)")2 1. 10 . \$!) OE!. .2 OE .
20 & 0 . 0 \$ 3. 0!+ 0 2 2.1 . 2 2.1 2 #
\$.! . 2 ! 12) OE&" OE 2 * " 2OE#".# \$ #" . OE 1. 1* \$! .
20\$ 0" 0&0 2 OE 1 * % 3 . #1 \$ + . 1#12
0 2 1 " P* 1# /)2 .!\$ " OE! 1OE. * . 1# ./ 1 # 0
/ . 12 0 0 2 ù\$.ü 1. ü üÿü . /0 . #OE 10
0 .OE+ 0 0" 0 .2 2 /& 0 .2 #! & 0#!+ 0)" OE # .
. !0 OE)! /0 0 . . OE0! &! .) 3.) 0 . OE 220
2 " \$+!."
. !0 OE)! /0 OE0! ! 02. 202& 0OE 8#/.1 + 2 # -
. 1# / 02. 0 1#12 .2 .OE 3# ." 10 ! " 3 ! + 0OE
0 / 3)! .2. &1 " . 2. 2 0 1. & " .OE+ 0 0" .#
!.2) OE! (OE 1) . 0OE !0 # 2 2..OE&2030!0.21 OE)2 2 +
\$. 1 + p 0OE OE2&1 .#2 02. 0 2)20! 10 2 0 " #%
.OE OE! ') 2. 2. .*1 . . 2. . *\$. 0 + 2 .OE 2*OE
0OE0 20 02. 10 0 ! 2 " . #1 /." .OE)22 "" ./ .OE&2/0/) .0 0"
.13. 12 " 0 13 ! " &" 2 20 .2. &1 \$&! " .OE)/0
ùOE . 2 10 .#2 2 OE!. .2)2 2. 2 ! 2 " 0OE0 /*0
3 ! " 0OE OE20 ." p 1* /01 2& 2. 0 . + \$. + 0 2.
0 2! 2) 1 . +" .-OLQRQ 0 \$ 1# # 12 0 &
OE0! &! & .OE) !#% " 12)1)OE&" . .3 !0 ùùüü 2.
OE!. # . 0 2 . OE + 2." 2 .1# 02! . OE ! 3)! 1 "
12 / 2 / ./ .2.. 0 . / .2 ! 1 # 2 /!.12 !)
. .2 /*1 . . \$ 0*1
p 1\$ 1 0 2 ! . & . 0 . . . 0 2 #!
1# &" /0 20 0 2. .OE) 0 & . 2 . . .OE) / .
01&20! !!\$0. / . ! 2 * " !) # " / 0 0 " / .1# / 10 " . 20
20 & 0 . " / ./ .1 0" . 2 / . 1 03. . & p)\$7) C
02. !0 + © 2! ."a RIIVKRUH / + 0 + 2 & .

1#12 2& ")œ.& LQIRUPDO YDOXH WUDQVIHU V\VWH
\$! .2 /)2 1 " . .œ) !#% " 2 " œ.! " /!.12 !)2 2." . /
/ .12.#!+ 2. 0 # + .2. .! &2 + 0 œ ! ." . !+œ&)
\$! .2 /)2 1 " 2! !.2 ."
p / .3 0 1\$*0 . / . & 0 2 " .!0 œ ! " œ!. 2 " "
\$. 1)" œ! 12.1 ." . / 0#) # 1 " 2 " œ!. ." p ù#!&
(332 .2. ! 30 \$.! . 2 ! 12 3.) 0 . . #120! & 0
3. & 0 œ+ .2. !.3+. . 1)œ " œ.! 0% " 0#! 2
0 0 2)! . . ù#2 2. 3.) 0 . /0 .œ / / 2.) 12 #
0 % 20\$ " #œ 12 ! " . 1# / 2. 0 2 œ
œ! 1&œ " 1\$ 10 " . œ0 .20 ! 1" 0 0.!2œ100! 'œ 2 010 " 1#
32 0 &" . 2 0 0! 1# 0! .1 . / 1 & 0 2 #! + 0 .!0
0 20 2." 2 . . 01 / 1 . . 0 !2 2 #" 0 \$ #
\$. 1 + / .3 0 ."
p .œ 20 01 .2 . 22 #2+œ! 0! œ ! # œ! (œ 20 . 1
12!.2 œ . . 1# /# 0 20\$ 1. 01 . ./ !
/ .1# ! . 1# 0! .1 . . 12. 0! œ 2 #œ 12 ! ü 0 %
1\$02 " œ!. 2 " 20 # #. 0.œ...œ!œ2!) 2. 10 . œ0/
0 1\$* 2." 2 œ!. . . 2 " 0œ .!* 10 " 12 /)1 1

*œ .2 ! 0" .!0 œ ! #

. !0 œ)! 0 3. 02. 10 œ " . / .3 !02 " !3
01. ! 1 #")œ&"2. /)1 . 2 # 0 .13
œ! 12.1 . 2& 0 + 1#)!& p ùùûü 2 .2.2 110 &" .
0 3 10 " 2 " 3 !/ .3# " .2. ! 3 2." 12 ò 01 2 #
20 & 0 . *" 0 œ\$ #" . œ 1. œ! 0" 0)/ #" 0
œ!. .2 " 1# œ0! 3 ! " . .œ #%. œ!. 10 " 0 .2 2 /&
ùùûü p 1* /01 2& 2. 0 . + \$. + 0 2. 326 0 2 *
. 2 œ0! +! ./ &2& 1# . 2.0+ 0 2 œœ 1 . /
0 œ ! .10 2 1* 2& !3+ .!0 œ ! # œ # . .œ2*11 2
01 " 0œ œ20 ."
p ù/ # œ!.2 !0)2 !3 " .!0 œ ! # #œ
œ!. / 1 . 0) . 2 # 3 !2 * 0 .3 !)ù32! *21 ! 3 1 .
œ! ') 2& œ # 0 20 #œ) 0 2. 10 #% 3 ! . 0 20

0 0 / 0# 0" 01 0" . / 0 0 " 1# 0" 0 1 2 0 /
/ . 20! .!*2 2. 0 !3 " OE ! * 0 . / .! # 0
. !0 OE)! .OE . ù *\$& ! ') 2&
!) 0 2. . 2 1# 120! !3 0 1\$#!) / 1)
#% 3 ! 0OE !# 1 .#2+ 2& OE! ') 2& / #! 0
OE.! / . 1 0 + 3 ! .OE+ 0 . 0OE 20 02# .OE)
. 2. & 1 * . 2 / 0 1/#1 OE.!OE & OE! ') 2& 12 . !
. *1 .
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.)2 2." 2 # ! 2 #" / &" 1& / . 0 2 #! + OE ! 3 ! .
20\$ " #OE 12 ! " 2& 20 & 0 & . 0 OE. /0#1 " 2& 1
p 0 1\$#1 2 " .OE 20 01 02 \$& 2OE!2(OE 20 0OE 1 " 2
OE! 1 1 2 # 3. # 1. .OE) 2 1* /01 2& 0 + OE 2
/# . 2 # . !0 OE ! # òOE &" 2 0 %KDV LQ
0&12!.2 1)OE &" ü /. 30 1# \$0OE0 7*1 #. ! "
OE! 0 / OE 1 " HDUO\ ZDUQLQJ V\VWHPV 10 ULVN SU
OE!. * 1 " 0 OE !0# .2 + ! + üOE OE 03.!
0 .2 " 12 " 10 0OE OE0/ /)1 ." / 1 " OE !0
02 OE 1) *OE OE2& 2 & / . 1 " . 12 / .12.*!&1 / +
. 2!.OE0 /0/ . 2PDU %DNDU p 0 1\$#1 2& 0
)OE &" 0 OE. /0#1 OE! 1&OE * . \$! 1 1#12 2& \$
0 2 +10 2 2 .)2 2. 2& .!\$+

ü#!&OE.') 01) OE . 1

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1& 2 " 1# 0! .1 ." 02. * 20LAF,!Europbl +. FRONTEX 0LAF
0!0# .OE 20" .2 2 # 2 * OE! (OE 1 * . 1# 0! 0
. / .12 " .!\$ " .2 .2.OE 1 EPP# . !0 FRONTEX
0 1\$*0 2 0OE 2 ! 1 1#)!& . 2 0 2 OE 1)EOPbl & 3
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(FARJ üOE OE!)1 02. ü#!&OE.' ò &1 \$0 . .OE 2* 0
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20 & 0 . + OE! .! + 1#12 CustomsInformation System- CIS . 2

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CE!) % " 2 " .CE 2 " . 0 1\$#1 " 2& 0 0 2 + 0 +. 2 2&
(EuropeanCommission FRONTEX . . 0 12 0 #! &" 12 / . \$0 !
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1& 12 \$0# & 0CE \$0 ! 10& 0CE 2 ! 1 " . 1# 0! .1 ."
(INTERPOL ü 2 *2 " 2 01) !00)2 CE #2 CE .0.2!) 1 2&
20 & 0 . + CE!. 2 + 0 2)" 2 " ü ü / #! 0 0# . ! 0"
! . & . # + Huber& DiGabrielle .! 2 " 1 . 2 " 20\$
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10) . 2. -! 2 CE!. 0 + . CE.! /0 . /# .2)2 2. . #1"
/0/ & 1& 1#1 DrenzoAnalytics /0 \$0 0 1& .2& 0 10) 0" 2
20 & 0 . " .!\$ " ù#2) / 0 10 .1# \$0 0" 102. 2& 12 \$02&
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0! . 0 .)CE&CustomsInformationSystem(CIS CE # 0CE 2! CE0 2 . 2
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. 2 2& 0 \$ # 0 + ü#!&CEPPO ü \$0. 0 0. 2 CE / &
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0 \$& . .CE #1 . 0 . ." CE! 1 1 " 12 .2CE0.3121.2
! . & . / 2#. . 0 02. 0* 2. 2. 01 \$ 1 -20 +02. * 2
(Huber& DiGabrielle 2009).

p /!#1 2 " ü#!&CE.' " EPRO 0 1\$#10 2 .CE 20 01 .2
12 CE / & / . !.2 + #CE 10& // &1#10 .CE!0 CE
. !0 CE ! # CE! ') 2& 0 #%) - ù 0 + 0 EPRO!.22 !. %20))
2 CE0! 11)20!0" .CE) #CE 10 " CE!. .1 " 20 & 0
01 ." 0 12 \$0 . / .3 EIPPO /) # ù 1 0 &2 0 . 0CE
0 1\$#1 2 # !) # 2 " ü#!&CE.EPPOü 1. CE .." \$0 CE .! /)
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/0/ & . 2 0 2 OE 1) *OE OE 2 & 3 0!2. ! /+ &"1#1 OE OE 0! OE 2
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ü 0 " / . . "1# 10

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12)1 OE!. OE!) 1 OE!. 0 1# ! 0 . 2& / 0 + 0
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#!+10& 0 .#2) 2 OE . 1 pü 1& 2 " * .1 " .2 2
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\$! .2 /)2 1 2! !.2 ." 8QLWHG 1DWLRQV OE !0üOE OE
.2.OE 1 " 2 " üOE 2 " 2/\$) / ./!. 2 0 .2. #2) !)
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(OLAF, 2021;FRONTEX, 2022).

p 0 .2 12)OE &" #OE !. DiGabriele + X E H U
OE !0 . #OE 12 ! 0 2 / 0 .2.OE 1 2 # . !
\$.!2 ! 3 1 " OE.! & !+ 03. . & . 2 " / .12.*!&1 " /0
/ .3 !02 # . / 1 + p 1# 0 13 ! .#2 .OE 2 / . 20!
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2! 0" \$! .2 OE 12&2 / . 01 . 2 " OE # . 12 * ./ .3.

/ . 1 2 & \$! 2 & 2017; Forensic Accounting and Fraud Detection, 2019).
0 CE+ " 0 1 \$ # 1 2 & / . ! . 2 + CE ! & 2) & + 0 ! 0 # +
. . CE 1 % 3 . + ± 0 ! CE & 0 & E O R F N F K S D U C E I n t e l l i g e n c e Q
platforms ± . CE 2 0 * ! 1 \$ # * " CE !) % " . . 2 . 1 2 " 2 # 3 .
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/ . 1 & / . ! . 2 + \$. 1 +
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ò . . CE) 2 . 1 . !) 2 0 ! . 0 CE) / . 1 2 . CE 2 0 0 1 . 2 .
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0 CE . * % 0 " 1 * \$ # 1 .) 2 & . . # 1 2 0 ! 1 0 " 1 2 . CE
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CE 0 ! . 0 1 . 3 0 " \$. 1 * " / . 0 2 # !) 2 2 . " * 2 0
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OE .23)! 0" / .1* /01 " 0 0" 10 " /0/ & 0 0 %0
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. 0OE.! " 0OE)!3&1 2& #OE. & OE0! ! # /!.12 2 /#
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\$ # OE! \$&! 10 10 / . 0 2 #! " *10 ")OE&" p ù .
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" 0 / .)!3&1 0)" * OE . 1 # 0
&/ OE 0" / ./ .1 0" 1# 0! .1 ." 02. * 2& 0 OE 0) 0
/ 0 " 0 OE0 ! . /0 \$ 0)2 /!#1 + 2!& OE ! 3 ! +
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" ü OECD OE 2+ ! 1/ ! 1)")12 #" 2 # .!0 OE ! #

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OE!. & 3 ! EAT&F, 2020).

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2 - ù . 2 ü /) -)! .2. &1 " . 2!. 0 19
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./ &2. OE!.OE . .OE OE! ') 2. 2 0OE !.10 2.
.! . ÿ úü #OE OE&" 010"±)OE&"OE2+0OE&1 2 "
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12 0OE 1 . 1& \$. 1 + © 00Osálon& Igb&dyi, 2 &
2023).

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ü 2 1 . 20 OE 1 1 # 12 . 1 2 # .!0 OE !
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 . 10 1# OE !&".22 0 ")OE&" 02.3 ! " .OE 0#1 . .
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 0 3 1 " OE 0! 12.2 + .OE 2 " . /# .2)2 2. . \$ 0#1 " 2
 OE! 10 10 forensic risk modeling .1 2. 12 12.2 12 1#1\$ 2 1
 *OE OE 2& 0 OE ! + 2 & 2#OE!.3+ . 120& !.0 +
 01 + OE!. Haid et al., 2024).
 p . #1 /* # 12 OE . 1 2 " 0 .2 " 12
 .!\$ " 2 " 01&20! " 0 0 2 " .investigative audits ") OE&# 2 ! 1
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 / .! OE!. * 1 ! 1 & 02. 2+ / #! + 2." © #OE
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 clustering anomaly detection . neural networks OE! 13 ! # 0 . *20! . ! 0 .
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 . !+OE " .) 1 " . \$. " 1 " +120 2 1*12 . .
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12 predictive framework 0 1\$*0 . 2 2 " /# .2)2 20" .2.12
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& " 1# OE0 0" 2 # . !0 OE ! # /0 OE0! ! 2.
2 # ! 2 # " p # 3 ! . OE.!.OE /#& & OE! ') 2&)OE&"
. *1 . . .2 . .OE / #! 0 1 .! * " /* # " . 2
. ! . 2 0*! " . 1#12 .2)2 2. 2 " OE.!. " 20
3.) 0 . /#1OE 12 ." .OE . 2 12 # " 0 0* *# 2 3 !#OE
1# 0 / 1 ÿ/ . 20! . 1#\$. OE! . 0 . 2 . !0 OE)! OE
OE .3. !0 .OE) . & . 1 . 2 12 \$0 . 2 " 12 ! '
.OE /# . + 0 2 1#

!) " 2 " 0 .2 12" " 12 OE 1 2 OE 1 .OE& 0
. !0 OE ! #

p 0 .2 12 OE! 13 !0 #1 +/ 0! . 0
OE 1 2 OE 1 2& + .OE& 0 + OE # OE! . * 2. .OE)
1& 2 " 1#12 .2 " OE.!. * 1 " ! + / 030*. & " 2 10&
. .OE 0 2& õOE&" 0OE 1 Angbe2.. P(OE)aru2 # " .)2 2.
2& forensic auditors . 0 2 OE # 1 0 . .OE 10& 02. * OE!
. . 0) 0 & + /0 2+ 1# 0 . ! 12) 2 "12 2.#OE'
2 # * 0 .2 " 1& 2 " 1# " /0/ & .OE)
\$. 1 * " 2!.OE0 " ! " . 12 .!\$0 . 0 . /# .2 0
/ .3# *1." 3 ! 2 ." * " . + " . 2& 0 0 2& 10 1 /
3)!& .2. &1 ")OE&" . . *0 Ali etal.(2024). 2&
. ! . 2. 0#! .2. .OE) 2 0 \$ + OE.!.2
0 2 OE 2. 12 " 02. ! " / +10 " .OE . *OE2 # 2 . #
2 10& 1# 0 / 2 " .OE) !#% " ./+. OE!. 2 " OE # 0
\$.!. 2 ! 12 " 12 " OE0! OE2+10 " . !0 OE Ali etal)OE&" 2 p #
0 .2 12)2. 1# /# 02. 0 2 . . #1 '
" .OE / 2)2 2." 0OE 2! OE0 2 1 !2&0!OE!OE!.2 +
0OE OE2+10& 2 # 3. # 10 0OE OE0/ ùü .OE.1\$) 1 " .
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2 # OE! .2 " . . 2 \$!. 12 \$0# 2& "OE . 2 +
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œ!.! 2#œ + 1& œ!.! patterns10 " 0 . /0/ Gendronetal p
\$! 1 0! . blockchain . 2 \$.1)2 2. . . #2. 0.œ .
3.! . 0#2 œ! ') 2. 1# /# 02. 0 12.2 12 . #1
0 2 œ 2. 2. 1 0 . #% * /* # .!0 œ ! " /!.12 !)2
.! 2 0&! 2) œ 0 2 . 2 " 0 .2 " 12 "
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01 02 œ . 1 0 1&forensic! 2 & 12 " / . / .1 0" 0 \$
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#% * /* #)œ&" 2. .*1 . . 2. .œ üœ œ
0 \$ # .œ 20 * 0 .œ) 20 & 0 . *" 12 " . 0 /
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)12 " œ!) % " 20\$ " œ!.! 10 "

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0œ0 /*10 " 12 0 .2 12 . 12 #" 01&20! *
œ .œ 1 . 3 & . * 03Belix 0 0#!+ œ # / .œ. 2. 10 1
. ! " . \$ 0#1 " . 01&20! + 0 \$& œ !0 . .œ 2! %
œ0 2.œ 1 ." . " / &" 10 / #")œ&" 2. .*1 . . 2. .œ
.œ+ 0 0" .œ) 2 .0!0. œ)!\$! #% "
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2 & \$. 1 + 0 \$ # / 0 10 1# 0\$0 " / .!! " !.2 + 01)/
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ü OE OE Anghel . Poenaru # OE !. #2 OE)&2 " 0 OE /#1 "
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p .) 1 2 " " .OE / 2)2 2." 2& 20\$ +
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2 /.OE 0 \$ # . /. 1# . . " . # # 2 " OE .):
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OE!) 0% " 0OE 2! OE 2." 12 # " 0 0 2 * " 3 !0 " . 12 \$ C
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õ OE &" . .3 ! Royetal 1\$ 1± 3)12"##OE !
2 " 20\$." 0 . / . 20! . . 1 2 10 OE0! OE2+10 " 0OE . .
1#12 .2 #OE 2) 1 0 1. & + . . # 3 ! . .OE
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0 2 #! 0 1& OE ! OE! \$ 2." 2.\$*2 2. .#2 .2 OE 1 .
/ ./ .1 0" OE0! ! 2." 2 " 0# .! 0" / .3 ! " ü /0 2
0 2 OE 1 * .OE 2 " .OE) /)1 # " ! . 1 * " 12 " p & 0"
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. * 1 2 # OE! (OE Osaloni & Igbekoyi ü#2) 0OE 0 . + 0)
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01 OE!) 01 ! 2.

6. 0\$ " *10 " ü 2 OE 1 * .2 #2.120 OE ! #

6.1 0\$ 2 1*, Big Data . PredictiveAnalytics

p 03.! 20\$ + . #1 " 0 #) # /0/ & 1# OE0
0)/& 20\$ 2 " 1* " 1# 0 12 .! 0 2 OE 1)
/ . 1 " p . OE 1 0 & 20 & 0 . + /0/ & OE !0
. ! OE!) 0% *OE.OE2& . 1# . . + 0 1\$* 2." 2 /#

12 \$0# & 0 Walid & Lyngdoh ü /)20!. predictive
analytics CE !0 . 0 2 CE 0 © 2 . / . 1 "a 2. CE . 0
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p . CE 2# . . CE 1 CE! & % 3 . + 0! . 0 &
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! 1 2 . . CE!) % . .2.12 2 # . !0 CE ! #
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. & . + . CE ! *10 . 02.1\$.2 10 2 !) 2& 20 &
. 12+ 2." 2 !) 2 #) CE!2 CE.2 .2.12. 2) .! 2 1 .1 .) &
2& 1#12 2& 12 ü /. \$! 1 2 #" 0 . CE 0! ! 1
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p \$! 1 20\$ 2 " AI 1* . " #1 " 0 & &0Big Data .
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12 0 2A#hammarj 2024).

p 20\$ 2 1* 03.!) 02. #! &" 1& 20\$ + \$
(machinelearning)CE &" 0#!& " / " . .)classification) 1
algorithms CE # 0 CE 2! CE # 2 . \$ 0!#01 .CE 2 1 CE!)2# CE .)CE
. + . .* 1 CE& 10& CE! " 2! 20" \$+!0" -0 !.+2 12 \$.
0 CE . . .) 0 2) 1 10 / .1#Putri & Agustina" 2 0"
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ò . .) . CE 0 2 . 2& CE! 0 CE2 + . . *10& 0 .
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03 / .1 * . 0 OE " 20 ! &1 1# . . + ò21 0 0
OE ! * . .20# * # 2 #" 0 \$ #" OE 12 \$0# . 0 + 2
)12 " 0 Sharma & Panigrahi (2024).

ü OE OE 10 OE 0! 2. # % " OE # OE logistics." 2.) OE & "
predictive analytics 1# /# 2. 0 0 & \$ & ! GIS #1 2 0 2 OE 1)
.1# 12 & / ./! + \$! + . #120! 10 & 12 " ! "
\$.!. 2 12 OE # 1#\$ 1# / 2. 0 . !0 OE)! / . 1
OE ! ') Halal et al., 2022).

% 2." 20\$ 0 . 12 2 \$! 1 2 " 20\$
. 2 " . #1 " /0/ &)\$.OE +" 0 OE # 2 . .OE * 2 & "
1* \$! . 2 02+OE 1 2 # . !0 OE ! # OE! 1/ / 2." 12 0
/# .2)2 2. . 02.2!.OE0 .OE) OE. 2)" / 2 " 10 0 0!) OE!

6.2 Blockchain . \$.1)2 2. . #1 /." 03 / .1 *

ÿ/ . 20!. 12 2 . && ..#2& 3.! & Blockchain .
OE! 13 !0 .# / .3 0 . . / 2 .2. !.3 2& 02. 1
OE!. .2) \$!) blockchain #0 . /# .2 OE!. * 1 2 " OE !0
OE! ') 2 " .OE) 2 OE!. & & " 2 0 /#2..2) & 12. .#2) .2 " .2. !
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03.! Blockchain OE 0! ! 02. 0 OE 2 # Proof-of-concept (EPPO)
& 12)1 \$0 / .OE /0 \$ 012)2 OE10# ! 10) 2 # 3. #
©/ OE " 2) 1 "a . 2& 0 + 0 . & + OE # \$! 1 OE
. !0 OE)! .# Bhasin (2016).

. 0! . Oblockchain 0 1\$* # 2 . OE 12 . 2 " 03 / .12
. 12+ 2." /# .2 2 OE!. * 1 0 OE! ') 2 " .OE) 2 12
\$! 2 .2. . &2 0 1# /#.1) 0 . .OE!. + PUF\$3 #1 *
)OE & " OE 0! ! Anillo et al. (2019 0 OE 2# \$ 02. OE ! " \$.1)
.OE 2! OE 02. OE!.OE 1 0 ! Ahmed ü OE OE # OE !. 0)2 2
blockchain.OE /01 0*0 2 1*12 . .OE) 0 2! " .!\$ " 0 1\$* 2.
)1 . 2 0 OE 12 1* 2 & 1# 22(\$\$) 2 & !0 #MDP21(2021)
/0 \$ 0)2 .OE NFC1 . blockchain 0 + 0 /!.12 2 #" /*
%0#/ 1#1 0#.1 + . .OE 0 2& 0 OE!.OE OE! 0#1

6.3 12 . 0 0 2 forensic analytics)

p 03.! 20\$ + IRUHQVLF DQDO\WLFV 10 1# /#.1)
1* \$0 . /0 \$ 0 10 0 0 +/0" 0! . 0 . 2 0 2 CE
. !0 CE ! " /!.12 !)2 2." 1& 2 " . #1 " 0 #) #
12 + /0/ & 10)CE\$!) .2 0 . /# .2)" 0 2 CE 1)" . &
#CE / + # .CE 10 " .CE) 2. 1# 0 CE ! CE!)2#CE.)(
03. . & 0 2) . !#3 " #CE0! 2 0" 2)2 20" -
2009).

p \$! 1 0)/& \$. " 10" 1# 0 2 &1 2 " .)2 2.
.!\$+ . 0 2 CE # *CE CE2. CE!)2#CE. 10 12 /0/ . 2)
10 .2.12. 2) AICEet CE 0/ òCE &" 0CE 1 . # \$GHMXP
\$! 1 20\$ + \$, ROUHQVLF DFFRXQLQJ O
) /# .2)2 20" 0 2& #12 !& 0 \$ # . . ! " CE.
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üCE CE 0 .2 12 CE! 13 !0 2 /# .2)
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\$Q\DGXED ò21 0 0 2 " 02.2! CE02. .CE) CE. 2
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üCE CE!)1 02. \$0 . . &! 120)2 forensic analytics & 10 2 &
/ . 0 2 #! " 10 " /0/ & ERP (Enterprise Resource Planning
0 1\$*0 2 /# .2)2 2. 120*!&'1 / . + 12 \$0 &
/ .3 !02 + 0CE \$0 ! 1 . + Craige2a#! + p / .1* /01 .#2+
CE ! 3 ! + 0 0! . 0 . 0&0 2 CE 1 * 12 ! 12 \$0 . 1#
2.\$*20! . . +! 1 *CE CE2& 0CE \$03 !!+.2 +! 1# forensic
Auditors . * 2. CE . 1# /# 1 # 20\$ " . . #2 " 12
% 3 . " 0 .2 . " CE! 0 # . . 2 02&CE 1 # 2.
" .CE 2 " CE # 1\$02 2. DGabriele,2008).CE)!

6.4 #12 .2. CE!. * 1 " logistics \$ #

p 0 1\$#1 2 " \$.1)2 2." 0 CE !0# 2& 1. .
CE ! 3 ! . 1#12 .2. ORJLVWLFV .CE 20 0 .1 CE! (CE)

. !0 OE ! # * \$! 0" 20\$ 0")OE &"2 *!06 6), ' !.1 ." .
/ !#3 ! / 2#. . OE * 2. / 10 / 0 " 0OE OE 0/ . 2
03 / .12 " . #1 /." / &" 10 0 OE !0* .2. #% * / * #)O
. 3.! . 0#2 OE! ') 2. 812'&
p \$! 1 GURQHCE 2 21 0!0 + . 11 & / ./! + .
OE ! 3 ! . 1#12 .2. / .\$0 ! 1 " 02.3 !+ 706 0OE 2!
.2. !.3 / ./! + 12 10& . .OE 10& .OE) 2 OE!
1# 0 13 ! 2." #1 .12 12 . ! 0 22OE & 1 % L OEUE W& N3 U
2006).

12)1 12 0 OE!. .2)2 2. # 2 1 .#2+ 2
OE!. 0 OE0! ! 1 p) 0! 03.! .3 ! 2 *36
. #1 & \$&! " . 1# /0*02. .OE) 0 2! 0 &/ 0.1.2.*!&1
/0/ . . ! " 2 \$.) 0OE OE 0/ % 3 OE 1 " 0
0 0 / 0# OE! 1&OE) . .OE #1 . !& # 0
/#1\$0!. # 2 03.! % 3 . * 0 \$ # . 0 OE / #
/ . 0 2 #! + 1&12 02. * /)1 & . / &2 + 3 ! & +
DiGabriele 2009).

ù 1 0 & 2 0 .)2 # 2 block chain . 2+ 0 \$ 2 "
. #1 /." 03 / .1 * \$0 03.! 120 OE 2 10 20 & 0 . " .
)OE &" 12)20! 2. . 2 .OE *! 0 + 2." 2 / ! 0 . 0
.2 . .# 2." 2 .)2 2. 0 2 OE 1 *World Customs/ +10
Organization p 0 1& 2&1 2 2 & 20\$ + 12 0
. .OE. 2 *10 0OE /#1 2)1 10 #OE / ")1 . 12 .2 !2 1
.OE 20 01 .2 \$TMS 2&2& . 1 2 !& .OE. 20 20\$ 0OE
OE 1.! 12 " .OE. 2 10 "logistics standards(Bierstaker et al., 2006).

üOE \$0 ! 1 . û . \$0 ! 1 . . " !. 2 "

0! .1 . 20 & 0 & 0 0 2 + .!\$+ . .12# ."

p .OE 20 01 .2 . 2 02+OE 1 2 # . !0 OE ! # OE! 1 ! *O
./# . 0" . . 10 01 " . / .\$0 ! 12 " OE. 0 0" O
/)1 2 . * 3& . 0 2 ÿ úü ./# . . 01 " .
% 3 . " / /01 " 02. * 2& 0 OE 0) 0 & .!\$+ 20 & 0 .
#OE !01 0" .12# . 0 OE / 0 2 . ! . \$ 0#1 *OE O

10& p 0CE 12 \$! 1 1# 0 ! & 20\$ +)CE&"
/0/ & / #! 0 . #12#0! 00 2 / . \$0 ! 12))12 " . 0
.CE 2!0CE2 .)2 2. 2& 0 0 2 + \$. 1 + .!
0 0 / 0# # . !+CE # /# . * 0 +10 " % 3 . " 20 !
. 12 . 0CE.! 2 03.! & 20\$ 2 " +#CECE\$!#2 0#
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ò . .CE) 2. .1 12 \$0 . 0CE \$0 ! 1 . " 0CE 2#\$." 12
0 . / . 0 2 #! 1# 0! .1 . 2& 20 & 0 . + #CE !01 +
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2 12 * üCE \$0 ! 1 . * 2! # ü 0CE \$0 !0 . . *%0
0 2 #! . 2 # \$0 /0\$ 0 ! 2) & 0 % " 12. 0! *
. ! " 2 p 0 CE0 ! . .CE) 2 ü#!&CE .EPPOü /0 \$ 0)2
1# 2 1)" 02. * 20 & 0 . + #CE !01 + 3 ! & 0 \$ # .
0 . . ! 12)" . 2 .CE 20 01 .2 03.! 2!& .2
/ . 1 " . . + / &")2. CE!) 0 2. . / .EPPO(2023)." #CE 10

üCE CE!)1 02. 10 0#!&CE.') 0CE CE0/ 2/\$) \$0 / #
CE .23)AFIS (Anti-Fraud Information System) CE . 0CE 2! CE0 2 / .1#
. 2. . CE ! 3 ! + . #CE 10 " .!0 CE ! # CE!.CE 1
20 & 0 . .2. p \$! 1 2 # \$),6 \$0 0 2 +10 2 /# .2)2
#CE 10& ! . & " .CE 2 " 2*CE # FDURXVHO . / & 2
. +" 1# /# 0 /0/ . .CE) 20 & 0 . " / +10 " 02.3 !
*" 0 \$ #" 2).\$)

.! . FRONTEX 1# /! 0 12 0 \$ 2& 0 &20! + 1#
2 #EUROSUR (European Border Surveillance System) 0)" / . 0 2 #! * / 2*
0CE 2 ! 1 " CE # . CE 0 / !#3 ! " 0) 0" 0! " 0!0"
20\$.CE212# ! 0 . ! 1 . 2 \$.!2 ! 3 1 . 11 &
/ ./! + #% * /* # / . 20!. . 2 ü / . CE # / . 20
. 1 & 2)EPPO(2023).

õ CE&" 0CE 1 . #etal &UDLQ 0CE 2#\$. 2 2 0 .12#122 2&
)\$) .CE) 2 20\$ #CE / . #! &" .CE) 2 *CE.! 0
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üCE &" #1 .12 / 0 " 1# 0! .1 . /0 CE !0 !.3 CE0!

1# 3& + . . Œ!.20 / .1* /01 2& 10& /0/ &
Œ!&2) . . 2 /!..1 / .! 0Œ)!3&1 2& 0 0 2+
0 & 0 . " / ./ .1 0" . 0 \$
* 3& . 0 2. ü2 1 . 2.2 12 û0 2 . 2 " ùùûü . 2
û . 2& 20 & 0 & .# . .2 32 2." 12. /
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0Œ 0 . + 0 2 .Œ 20 01 .2)2 2. 2& /! 10& 0 1\$#1 " 2
2 . .2 ! 1 " .# " Œ.! #1 ." 12. 1* !. . 2. 20 &
/ 0#1 " 0)")2 12)\$ #Œ 0! . *3 . 2)1 10 0
01)/&)1 . 10 .!) 0 \$& .Œ /0 *0)2 DataDriven2 0
% " .Œ 3 10&2 .! Œ 1 " /* # 0 . .Œ 20 01 .2 1
. .Œ #% . !0 Œ ! + Œ!. 2 +
/ ./ .1 0" Œ # 03.!) 2. 12. 20 & 0 . \$ # ! 1 !
0 2 Œ 1 * Œ.! & 3 !2 & 2 120" Œ!. 2 " Œ 0! .
1#12 2& . #1 " risk-based profiling 2 0 .2 12.1 1.!&2+
. 2 + . +" . 2 #Œ \$!0&2 Œ.! . * 1) & 2& 3 !2 &
(WCO .! 2 ! 1 .#2) !) 12 ü /. 0 \$ Œ.!
.) .#2 .2 Œ .2 ¶ 0Œ 0 .Œ 2 01 . . / .30
! 1 0" Œ 1)2 20" Œ! ') 2&)Œ&" .*1 . 2). .Œ . ! "
p 0 Œ " . .)!3&1 2& 20 & 0 . + / ./ .1 + 0Œ /!
.Œ 20 01 .2)2 2. 2& 0 \$ 2 * 3& #1 2 #± ÷/ú# .
+ . ú \$. + ü!0# + 2 #%) / 2))12 "
0 % .#2 .2 Œ 1 " / * 10 1 03.! 2& / ./ .1
\$0!1. . 1* !. . 10 !)20! #" 20 & 0 . *1" .12#12*" 2& .Œ
risk-basedauditing / ./ 2 0 \$ 0 1 2 .) 1 /* #
. 0Œ.! .2. Œ)!& 0 .Œ 2 01 .2. ! . & . / 2#. . 0
2#\$) 2#3 1 0 . 2 # 1#12 .2 " + . 2) .#2) 2 ÿ u
12!.2 0 1\$#1 2 " 20 & 0 . " / 1 " 0 12)\$ 2 Œ
.Œ& 0 + 1# / 02. 01. 0 2 .2.Œ 1 2 # .!0 Œ ! #
ü Œ Œ . . 20 & 0 . " #Œ !01 0" Œ # .
0 Œ 1 0" . 0 2 #! 0#. .20 "+/00 Œ! 20!.)2 2.

OE! *OE 20 . .OE) / 0 0 ". 1#12" 10." 1)" 0 & (World
Customs Organization- WCO 2 0)2 0OE 2#\$. 2& 20 & 0 . + 0
)\$) 12 \$! 1 20\$ + 1&# ..2)2 2. 12 0 2 #!)2 2." 0
2& 3 ! & . 2 " 1# 0\$ *" 0 OE. /0#WCO 2& 120 0\$ +& 0 .
OE!. 2 OE! OE 0 . OE! 1.!) 02. 12 " 0 0 11) 0 0" !3 " OE
OE! (OE 20 0OE /#1 2)1 10 OE ! 3 ! . 12#12 OE 2#)1 .
12. 0! " 03.! " 01&20! + \$. 1 + 0OE OE Berstakere2 /
al #OE 12 ! #)2 20\$. .OE)) 2 " /0 .!
0 1& .2& 0 10 . 0 2 #!) 1\$. / . \$0 ! 1!+OE /* !#1)OE #
1# 0! .1 . 02. * .!)/ & 0 0 2 + . / 2 + .!\$+

ü1&20! 0 \$ 10 0OE \$0 ! 10 " . #1 /0" 03 / .1

01&20! 0 \$.OE 20 * 2 OE!+2 !. # ." .2
0OE \$0 ! .2 + / + p20 01%2.OE" 02. ! " / . # ! 1 " .
/ .12.*!&1 " OE! 0#2+ .OE #1 . 2 ! 1 " .) & \$.1
/ #! * 0 OE # OE ! * . 0 02. 0#2 * 2. .Blasine
2016).

01&20! 0 \$.OE 20 * 2 .OE!+.22 .1\$& / 0 1/#
. !0 OE ! + OE!. 2 + 12 03 / .12 . #1 / . . + " OE !
. !. . & . 0" 10 0 OE ! " ! " OE!.12.2 .OE .2.
0OE 1 . Singleton . Singleton ." .OE 20 01 .2))" 0 0&\$ 0
30 0 . 12 ! 02. 10 2! . .1 12 \$0 . . 0!.)2 2. 2&
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