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WKRXJKW WKDW /,57 PHPEHUV ZRXOG EH LQWHUHVWHG LQ NQRZLQJ PRUH
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D/,57&RPPLWWHH DQG 7DVN)RUFH &KDLUV &XUUHQWO\ ZH KDYH
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$W 6WHHULQJ &RPPLWWHH PHHWLQJV WKH &KDLUV UHSRUW RQ WKH DFWLYLWLHV DQG DFKLHYHPHQWV RI WKHLU FRPPLWWHHV 7KLV LQFOXGHV ZRUN WKDW KDV EHHQ GRQH MKURXJKRXW WKH \HDU DQG GXULQJ WKH FRQIHUHQFH 6WHHULQJ &RPPLWWHH SURYLGHV D IRUXP WR VKDUH LGHDV DQG
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ZDV ILUVW EURXJKW XS DW DQ ([HFXWLYH %RDUG PHHWLQJ 7KLV SROLF\ KDV VLQFH UHFHLYHG ([HFXWLYH %RDUG DQG 6WHHULQJ &RPPLWWHH DSSURYDO DQG ZLOO EH EURXJKW WR WKH PHPEHUVKLS IRU D YRWH 7KH
QHHG LQ WKH QHDU IXWXUH WR KDYH D /,57)LQDQFLDO 3ODQ ZDV

GLVFXVVHG DW WKLV SDVW 0LGZLQWHU([HFXWLYH %RDUG PHHWLQJ:KLOH
QRWKLQJ IRUPDO ZDV GHFLGHG WKH VHHG ZDV SODQWHG
1HZ GLUHFWLRQV IRU FRPPLWWHHV DUH H[DPLQHG 3UHOLPLQDU\
GLVFXVVLRQ

WKH QHHG WR KDYH D GDWDEDVH

ILOH PDQDJHU WR VXSSRUW WKH YDULHW\ RI OLVWV GLUHFWRULHV DQG ILOHV ZKLFK /,57 FRPPLWWHHV JHQHUDWH XSGDWH DQG GLVWULEXWH 7KLV

LGHD LV JRLQJ WR EH IXUWKHU H[DPLQHG E\ WKH 2UJDQL]DWLRQ DQG %\o PDQ

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PHW ZLWK WKH ([HFXWLYH %RDUG ZLWK DQ LGHD KH KDG IRU D /,57

SURMHFW +H GHVFULEHG WKH VWURQJ QHHG HVSHFLDOO\ LQ VPDOO RQH OLEUDULDQ OLEUDULHV IRU PRGHO LQVWUXFWLRQDO PDWHULDOV +H VXJJHVWHG VXFK LWHPV FRXOG EH FUHDWHG E\ /,57 PHPEHUV DQG SXEOLVKHG LQ WKH /,57 1HZV /DWHU WKHVH PRGHOV FRXOG EH FRPSLOHG RQ D GLVF
IRU IXUWKHU GLVWULEXWLRQ 0U.XKQHU ZLOO VXEPLW D ZULWWHQ GRFXo

PHQW SURSRVLQJ WKH DSSRLQWPHQW RI D WDVN IRUFH WR ZRUN RQ WKH GHYHORSPHQW DQG GLVWULEXWLRQ RI VXFK PRGHO PDWHULDOV +LV LGHD VKRXOG EH DSSURYHG E\ 0DUFK
$QRWKHU /,57 PHPEHU -HDQQH 'UHZHV VXJJHVWHG /,57 VSRQVRU D SURJUDP RQ SUHVHUYDWLRQ DQG OLEUDU\ LQVWUXFWLRQ UHODWHG SOHDVH WXUQ WR SDJH  

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0DQ\ DFDGHPLF OLEUDULDQV DSSUHFLDWH WKH VXFFHVVHV RI WKHLU DUHD VFKRRO OLEUDULDQV LQ WHDFKLQJ LQIRUPDWLRQ VNLOOV $FDGHPLF OLEUDULDQV EHQHILW IURP FORVHZRUNLQJ UHODWLRQVKLSV ZLWK WKHLUFRXQWHUSDUWV LQ WKH VFKRROV DQG VKRXOG LQFUHDVH HIIRUWV WR FRRUGLQDWH
WKHLU UHVSHFWLYH OHYHOV RI OLEUDU\ VNLOOV LQVWUXFWLRQ:KDW IROORZV LV DQ RYHUYLHZ RI VRPH LQVWUXFWLRQ VWUDWHJLHV DQG UHVRXUFHV LQ
WZR VRXWKHDVW.DQVDV VHFRQGDU\ VFKRRO OLEUDULHV

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&KDUORWWH)LOHV LV /LEUDU\ 0HGLD 6SHFLDOLVW RU WKH 0LVVLVVLSSL %DQG R &KRFWDZ,QGLDQV ORFDWHG LQ (DVW &HQWUDO 0LVVLVVLSSL

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6KH LV D JUDGXDWH RI0LVVLVVLSSL 6WDWH 8QLYHUVLW\ DQG LV FRPSOHWLQJ D 0DVWHUV LQ $GPLQLVWUDWLRQ DW 0LVVLVVLSSL 6WDWH 3UHYLRXVO\ VKH ZDV OLEUDULDQ LQ WKH $OGLQH,QGHSHQGHQW 6FKRRO 'LVWULFW +RXVWRQ 7H[DV OLEUDULDQ DW:LQVWRQ $FDGHP\ LQ /RXLVYLOOH 0LVV
DQG D FODVVURRP WHDFKHU ZLWK WKH %XUHDX RI,QGLDQ $IIDLUV

&KDUORWWH RYHUVHHV VHYHQ VFKRRO OLEUDULHV RQ WKH 5HVHUYDWLRQ LQFOXGLQJ VL[HOHPHQWDU\ DQG RQH VHFRQGDU\ VFKRRO 6WXGHQWV LQ.o J YLVLW WKHLU VFKRRO OLEUDU\ WKUHH WLPHV D ZHHN IRULQVWUXFWLRQ VWRU\ KRXUV DQG FLUFXODWLRQ /LEUDULDQV UHYLHZ WHDFKHUV OHVVRQ SODQV IRU WKH ZHHN DQG WHDFK UHODWHG OLEUDU\ VNLOOV
7KH KLJK VFKRRO OLEUDU\ KDV D IOH[LEOH VFKHGXOH IRU OLEUDU\ XVHUV 7KH OLEUDULDQ GRHV RULHQWDWLRQ LQ WKH EHJLQQLQJ RI WKH \HDU DQG DVVLVWV WHDFKHUV ZLWK LQVWUXFWLRQ 7KH OLEUDULHV DUH VWDIIHG E\ &KRFWDZ ZRPHQ DQG IXQGHG E\ D JUDQW IURP 'HOWD.DSSD *DPPD
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1RQ/,57 0LGZLQWHU 0HHWLQJV 5HODWHG WR /LEUDU\,QVWUXFWLRQ

7KLV LV DQHZIHDWXUHIURP WKH 857/LDLVRQ &RPPLWWHH 'XULQJ FRPPLWWHH GLVFXVVLRQ DW ODVW VXPPHU V FRQIHUHQFH LW ZDV DJUHHG WKDW VLQFH PHHWLQJV DUHIUHTXHQWO\ VFKHGXOHG VLPXOWDQHRXVO\ LW ZRXOG EH QLFH WR NQRZ ZKDW WUDQVSLUHG DW DOO WKRVH RWKHU PHHWLQJV RQH FRXOGQRWDWWHQG 7KLV LV DSLORW DWWHPSWDW WKH DERYH 7KH PHHWLQJV KDYH EHHQ UHSRUWHGRQ E\ PHPEHUVRIWKH /LDLVRQ FRPPLWWHH ZLWK RXU QDPHV DQGSKRQH QXPEHUV VXSSOLHG LQ SDUHQWKHVLVIRU WKRVH WKDW KDYH D EXUQLQJ GHVLUH WR NQRZ PRUH DERXW DSDUWLFXODU VHVVLRQ 3OHDVHIRUJLYH DQ\ RYHUVLJKWV RU LQDFFXUDFLHV WKDW PD\ EH GXH WR FLUFXPVWDQFHV DW WKH WLPH RI WKH VHVVLRQ

$/$8VHU,QVWUXFWLRQ IRU,QIRUPDWLRQ /LWHUDF\ &RPPLWWHH

7KH DUWLFOH ZULWWHQ E\ 7RP (DGLH LQ /LEUDU\ -RXUQDO ODVW)DOO ZDV D WRSLF RI FRPPLWWHH GLVFXVVLRQ (DGLH FODLPHG WKDW VWXGHQW LQVWUXFWLRQ LQ OLEUDU\ XVH GLG QRW ZRUN WKLV FRPPLWWHH ZLOO SODQ D GLVFXVVLRQ RI WKH WRSLF IRU WKH   6DQ $QWRQLR 0LGZLQWHU &RQIHUHQFH 7HQWDWLYHO\ PHPEHUV RI D SDQHO ZLOO PDNH VKRUW SUHVHQWDWLRQV RQ ERWK VLGHV RI WKH LVVXH DQG LQYLWH DXGLHQFH ,? SDUWLFLSDWLRQ -RKQ 7\VRQ &RPPLWWHH &KDLU 0DUVKD.RURENLQ   

$&5/%,6 $FFHVV WR 0RGHO 6WDWHPHQW 7DVN)RUFH

%,6 LV GHYHORSLQJ D UHVRXUFH GLUHFWRU\ RI LQGLYLGXDOV XVLQJ WKH 0RGHO 6WDWHPHQW $ VXUYH\ LQVWUXPHQW ZLOO EH VHQW WR XVHUV %HWK:RRGZDUG &KDLU %DUEDUD &RQDQW 

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7KH FRPPLWWHH WKDQNV HYHU\RQH ZKR FRPSOHWHG VXUYH\V LGHQWLI\LQJ VWDWH /,57 JURXSV RU RWKHU RUJDQL]DWLRQV WKDW ZRUN ZLWK OLEUDU\ ELEOLRJUDSKLF LQVWUXFWLRQ $ GLUHFWRU\ RI WKHVH JURXSV LV EHLQJ FRPSLOHG DQG SXEOLFDWLRQ SODQV DUH EHLQJ FRRUGLQDWHG ZLWK WKH SXEo OLFDWLRQV FRPPLWWHH IRU DYDLODELOLW\ GXULQJ  ,I WKHUH DUH JURXSV WKDW KDYH QRWEHHQ FRQWDFWHG SOHDVH JHW LQ WRXFK ZLWK RQH RIXV DV VRRQ

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'HILQHV +\SHU&DUG DQG XVHV D WRXU RI WKH $SSOH /LEUDU\ WR GHPRQo VWUDWH LWV IHDWXUHV ([SODLQV KRZ +\SHU&DUG DQG LWV DSSOLFDWLRQV DVVLVW SDWURQV ZLWK GLUHFWLRQDO TXHVWLRQV DQG DQVZHUV &RQFOXGHV ZLWK DQ H[WHQVLYH ELEOLRJUDSK\

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'HVFULEHV DSSUR[LPDWHO\  EDFNJURXQG DUWLFOHV RQ K\SHUWH[W SURo JUDPV VRIWZDUH DQG UHODWHG LVVXHV

)UDQNOLQ &DUO 7KH +\SHUPHGLD /LEUDU\ 'DWDEDVH  -XQH
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'HVFULEHV K\SHUPHGLD ZKLFK DOORZV WKH DVVRFLDWLYH UHWULHYDO PDo QLSXODWLRQ DQG VWRUDJH RIPXVLF YLGHR WH[W DQG JUDSKLFV ([DPSOHV RI DSSOLFDWLRQV DUH JLYHQ WKH XVH RI K\SHUPHGLD ZLWK LQWHUDFWLYH YLGHR DQG ZLWK PLFURFRPSXWHUV LV GLVFXVVHG +\SHUPHGLD LPSOLFDo WLRQV IRU OLEUDU\ DQG LQIRUPDWLRQ VSHFLDOLVWV DUH H[SORUHG

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'LVFXVVHV PDMRU DVSHFWV RI DXWKRULQJ K\SHUWH[W GRFXPHQWV DQG GDWDo EDVHV IRU LQWHUDFWLYH LQVWUXFWLRQ +LJKOLJKWV LQFOXGH NQRZOHGJH VWUXFWXULQJ URRW GRFXPHQWV DXWKRULQJ SULQFLSOHV VFUHHQ IRUPDWV FROODERUDWLRQ DPRQJ DXWKRUV DQG FRJQLWLYH SURFHVVHV

.LQQHOO 6XVDQ DQG 7\GH 5LFKDUGV $Q 2QOLQH,QWHUUDFH:LWKLQ D +\SHUWH[W 6\VWHP 3URMHFW -HIIHUVRQ V (OHFWURQLF 1RWHERRN 2QOLQH  -XO\   
'LVFXVVHV 3URMHFW -HIIHUVRQ D VXFFHVVIXO FXUULFXOXPEDVHG SURMHFW XVLQJ $SSOH &RPSXWHU V +\SHUIODUG VRIWZDUH DW WKH 8QLYHUVLW\ RI 6RXWKHUQ &DOLIRUQLD $OWKRXJK WKH SURMHFW ZDV RULJLQDOO\ GHVLJQHG WR DVVLVW IUHVKPHQ LQ DFTXLULQJ VNLOOV QHHGHG WR ZULWH UHVHDUFK SDSHUV LW KDV VLQFH H[SDQGHG WR LQFOXGH RQOLQH GDWDEDVHV

/DUVHQ 0DUN ' 'HDOLQJ <RXU 2ZQ+DQG ZLWK +\SHU&DUG +OVSDQLD  0D\   
+\SHU&DUG D PXOWLIDFHG VRIWZDUH SDFNDJH IRU WKH 0DFLQWRVK LV UHYLHZHG +\SHU&DUG XVHV D ODQJXDJH FDOOHG K\SHUWH[W ZKLFK LV SDWWHUQHG DIWHU HYHU\GD\ ODQJXDJH DQG GHVLJQHG WR DOORZ IOH[LELOLW\ LQ WKH OLQNLQJ DQG PDQLSXODWLRQ RI WH[W JUDSKLFV DQG VRXQGV 'HVFULEHV RQH XVH RI +\SHUFDUG LQ DQ DGYDQFHG FRXUVH RQ /DWLQ $PHULFDQ
SRHWU\

/DVN\ 5LFKDUG ' +\SHU7DON 3URJUDP 'HVLJQ %\WH  $Xo JXVW   
*XLGHV XVHUV LQ SURJUDPPLQJ +\SHU&DUG ZLWK +\SHU7DON WR FUHDWH HIILFLHQW SURIHVVLRQDOORRNLQJ VWDFNV 6RPHZKDW WHFKQLFDO EXW YHU\ XVHIXO IRU DQ\RQH GRLQJ +\SHU&DUG SURJUDPV

/LQ;LD $ 6HOHFWHG +\SHUWH[W %LEOLRJUDSK\ (GXFDWLRQDO 7HFKQRORJ\  1RYHPEHU,  

7KH DXWKRU D GRFWRUDO VWXGHQW FRQGXFWLQJ UHVHDUFK RQ SHUVRQDO LQIRUPDWLRQ V\VWHPV KDV FRPSLOHG D VHOHFWHG ELEOLRJUDSK\ RI FODVVLF ZRUNV VXUYH\V DQG RSLQLRQV V\VWHPV DQG DSSOLFDWLRQV RI K\SHUWH[W

/\QFK $QQH 3URMHFW -HIIHUVRQ DQG WKH 'HYHORSPHQWRI NHVHDUFK 6NLOOV 565 5HIHUHQFH 6HUYLFHV 5HYLHZ )DOO    

'LVFXVVHV WKH 8QLYHUVLW\ RI 6RXWKHUQ &DOLIRUQLD V +\SHU&DUGEDVHG SDFNDJH IRU SURYLGLQJ LQWHUDFWLYH OLQNDJH EHWZHHQ FRXUVH DVVLJQo PHQWV GDWDEDVH WR KHOS RULHQW VWXGHQWV WR UHVHDUFK,OOXVWUDWHV KRZ RQOLQH GDWDEDVHV RIIHU WKH SRWHQWLDO IRU UHWULHYLQJ DQG PDQLSXODWLQJ D YDULHW\ RI UHVRXUFHV

0DQHV 6WHSKHQ +\SHUWH[W $ %UHDWK RU $LU)UHVKHQHU 3& 0DJD]LQH  -XQH    
%ULHIO\ FULWLFL]HV PXFK RI WKH K\SH DERXW K\SHUWH[W $UJXHV WKDW K\SHUWH[W KDV WKH GDQJHU RILQFUHDVLQJ LUUHOHYDQW UHWULHYDO DQG VKDOORZ OHDUQLQJ SDWWHUQV

0DUFKLRQLQL *DU\ +\SHUPHGLD DQG /HDUQLQJ)UHHGRP DQG &KDRV (GXFDWLRQDO 7HFKQRORJ\  1RYHPEHU    'HVFULEHV K\SHUPHGLD DQG LWV SRWHQWLDO XVHV LQ OHDUQLQJ DQG WHDFKLQJ +LJKOLJKWV LQFOXGH VWRUDJH DQG PDQLSXODWLRQ RI LQIRUPDWLRQ OHYHOV RI OHDUQHU FRQWURO WKH UROHV RI WHDFKHUV DQG OHDUQHUV DQG WKH LQWHUDFWLRQV

EHWZHHQ WKHP WKHRUHWLFDO DQG WHFKQLFDO SUREOHPV LQVWUXFWLRQDO GLIo ILFXOWLHV DQG HYDOXDWLRQ SULQFLSOHV IRU K\SHUPHGLD

0DUFKLRQLQL *DU\ DQG %HQ 6KQHLGHUPDQ )LQGLQJ)DFWV YV %URZVLQJ.QRZOHGJH LQ +\SHUWH[W 6\VWHPV &RPSXWHU  -DQXDU\   
7ZR HDUO\ GHYHORSHUV RI K\SHUWH[W V\VWHPV GHPRQVWUDWH WKH EHQHILWV DQG GUDZEDFNV RIWKLV WHFKQRORJ\ WKURXJK H[DPSOHV RI+\SHUWLHV DQG WKH (OHFWURQLF (QF\FORSHGLD 3DUWLFXODUO\ JRRG IRU LWV GLVFXVVLRQ RI KXPDQFRPSXWHU FRPPXQLFDWLRQ LVVXHV DQG XVHU OHDUQLQJ VW\OHV

0RUDULX -DQLV +\SHUPHGLD LQ,QVWUXFWLRQ DQG 7UDLQLQJ 7KH

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3RZHU DQG WKH 3URPLVH (GXFDWLRQDO 7HFKQRORJ\  1RYHPEHU
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3UHVHQWV WKH LQVWUXFWLRQDO GHVLJQHU V SHUVSHFWLYH RQ K\SHUPHGLD DUJXLQJ IRU OHVV K\SH DQG PRUH DWWHQWLRQ WR HVWDEOLVKHG SULQFLSOHV RI GHVLJQ 5HFRPPHQGV XVLQJ NQRZOHGJHDEOH SURIHVVLRQDOV VXFK DV V\VWHPV DQDO\VWV VXEMHFW PDWWHU H[SHUWV DQG LQVWUXFWLRQDO GHVLJQHUV ,QFOXGHV D FRQFHSWXDO PRGHO IRU GHVLJQLQJ LQVWUXFWLRQDO K\SHUPHGLD

1RUGJUHQ /D\QH ( DQG 0LFKDHO $ 6HLEHU 0DFLQWRVK $SSOLo FDWLRQV LQ WKH 0HGLD 6HUYLFH'HSDUWPHQW DW 3DFLILF /XWKHUDQ

8QLYHUVLW\ V 5REHUW $/ 0RUWYHGW /LEUDU\,Q 0IIFLQWRVKHG /LEUDULHV HG E\ %LOO 9DFFDUR &XSHUWLQR &DOLI $SSOH /LEUDU\ 8VHUV *URXS   SS 
'HVFULEHV KRZ PHGLD VHUYLFHV VWDII XVH YDULRXV VRIWZDUH SDFNDJHV LQFOXGLQJ +\SHU&DUG