ON OPTIMIZATION OF FUTURE AVIATION SECURITY CHECKPOINT EFFECTIVENESS

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SO WHAT? WHO CARES?

- Space: *IEDs & weapons carried through AVSEC checkpoints*
- Problem: *Future security effectiveness of **whole** checkpoints: should we focus on technology development or on configuring/combining them in checkpoints?*
- Solution: *Modeling & simulation by (validated) TNO model AvSCERT*
- Results: *Comparative gains of different strategies - checkpoint configuration and technology development:*
  *- substantial increase in **system** detection (Pd)*
  *- and order of magnitude reduction of **system** false positives (Pfa) while maintaining high Pd*
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OUTLINE

- Scoping: AVSEC whole checkpoint performance and effectiveness
- Analysis of some example cases of checkpoint cabin baggage screening
- Conclusions

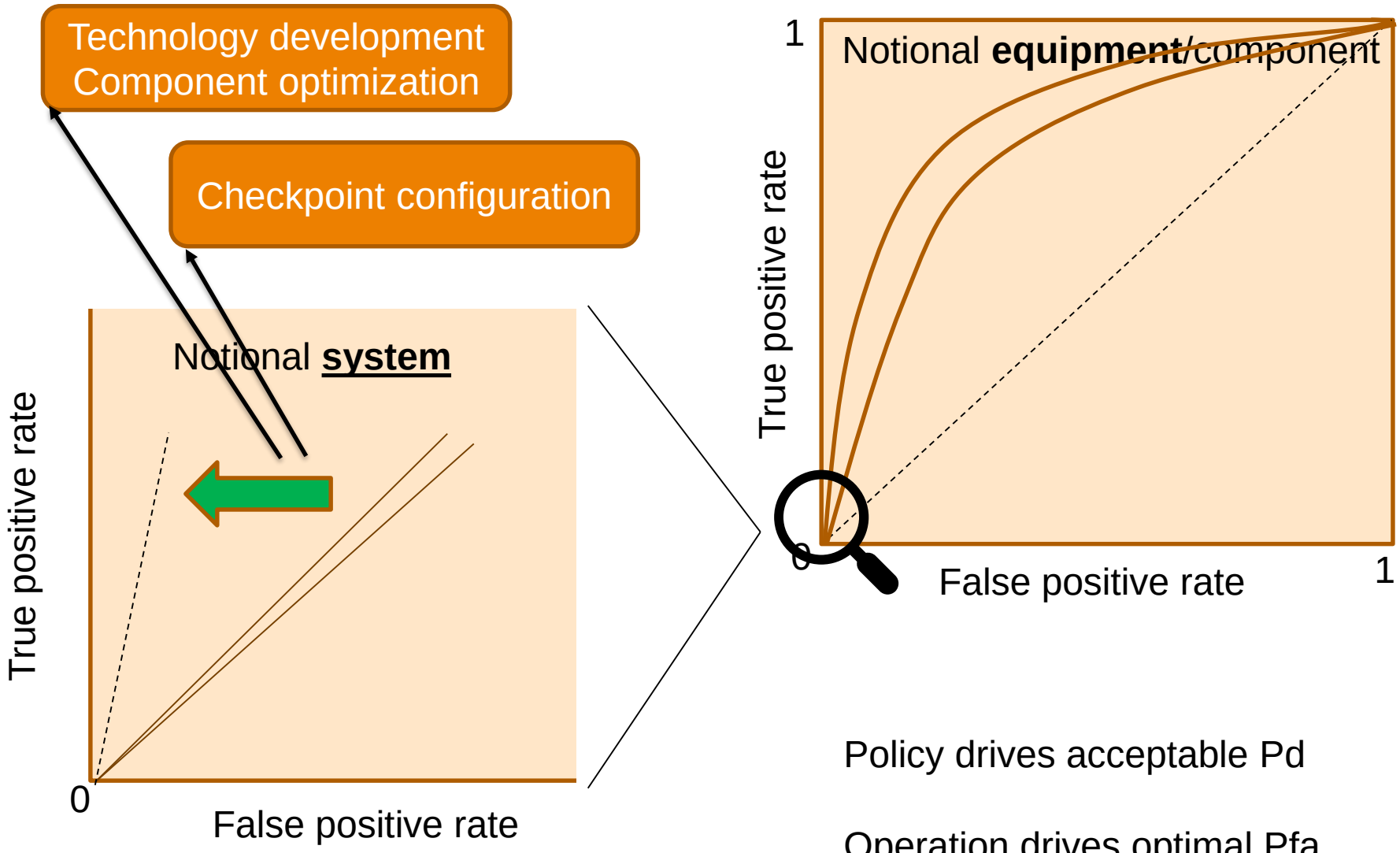
AVSEC CHECKPOINT EFFECTIVENESS

- Checkpoint *effectiveness* is the degree to which the whole checkpoint system succeeds in stopping an attack on an airplane by means of detection of forbidden items (at acceptable system false alarm behavior).
  - A checkpoint is a **system** of detection technologies, humans, and interactions
  - Subsystems: screening of passengers, cabin baggage, and hold baggage
  - Effectiveness is not the only KPI - impact on the operation and on passengers

- Obvious influence of technology performance and checkpoint configuration

- TNO developed a model (AvSCERT) for prediction of checkpoint system (and sub-system) performance, enabled by reliable data.

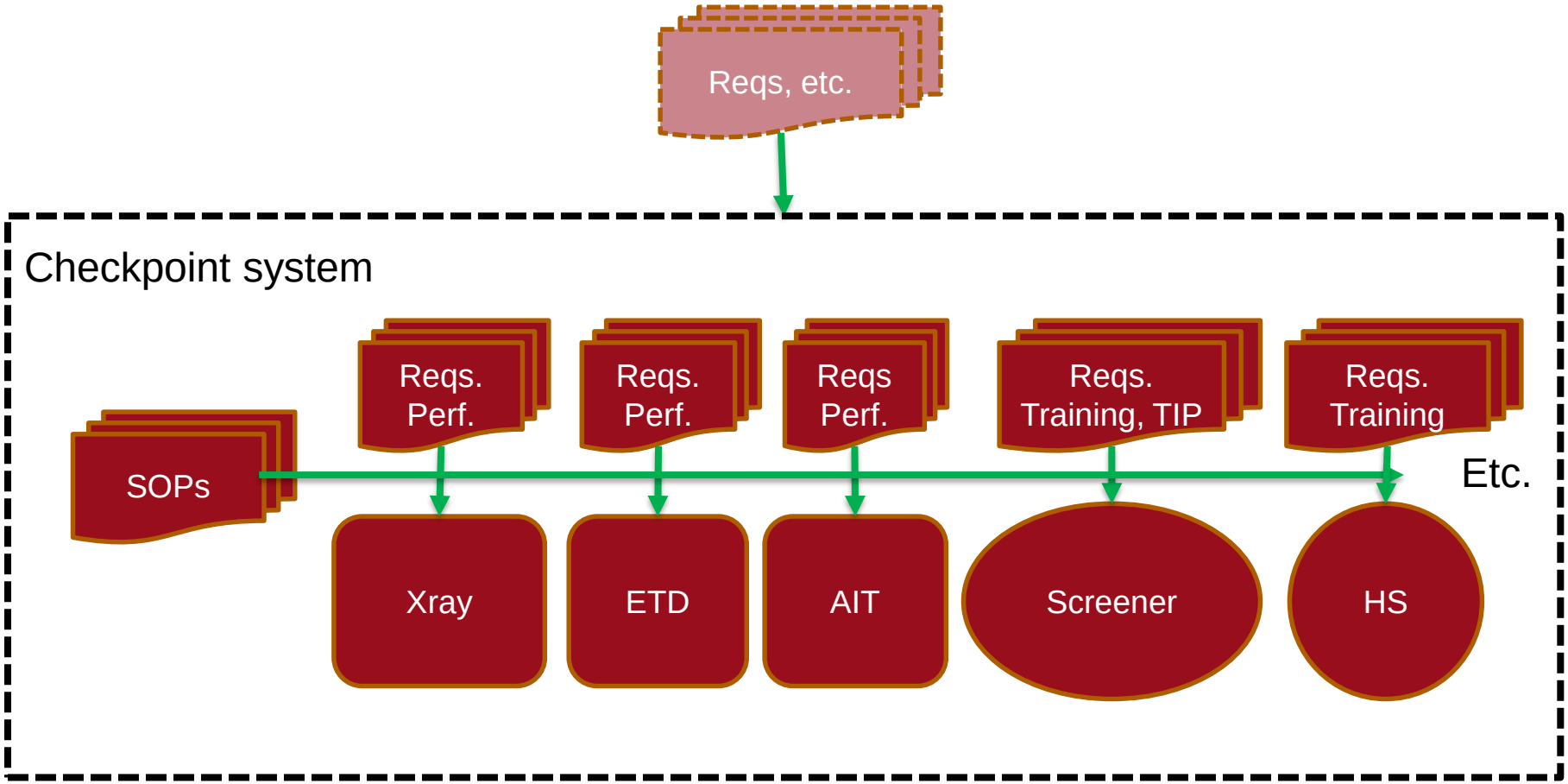
THE CHALLENGE



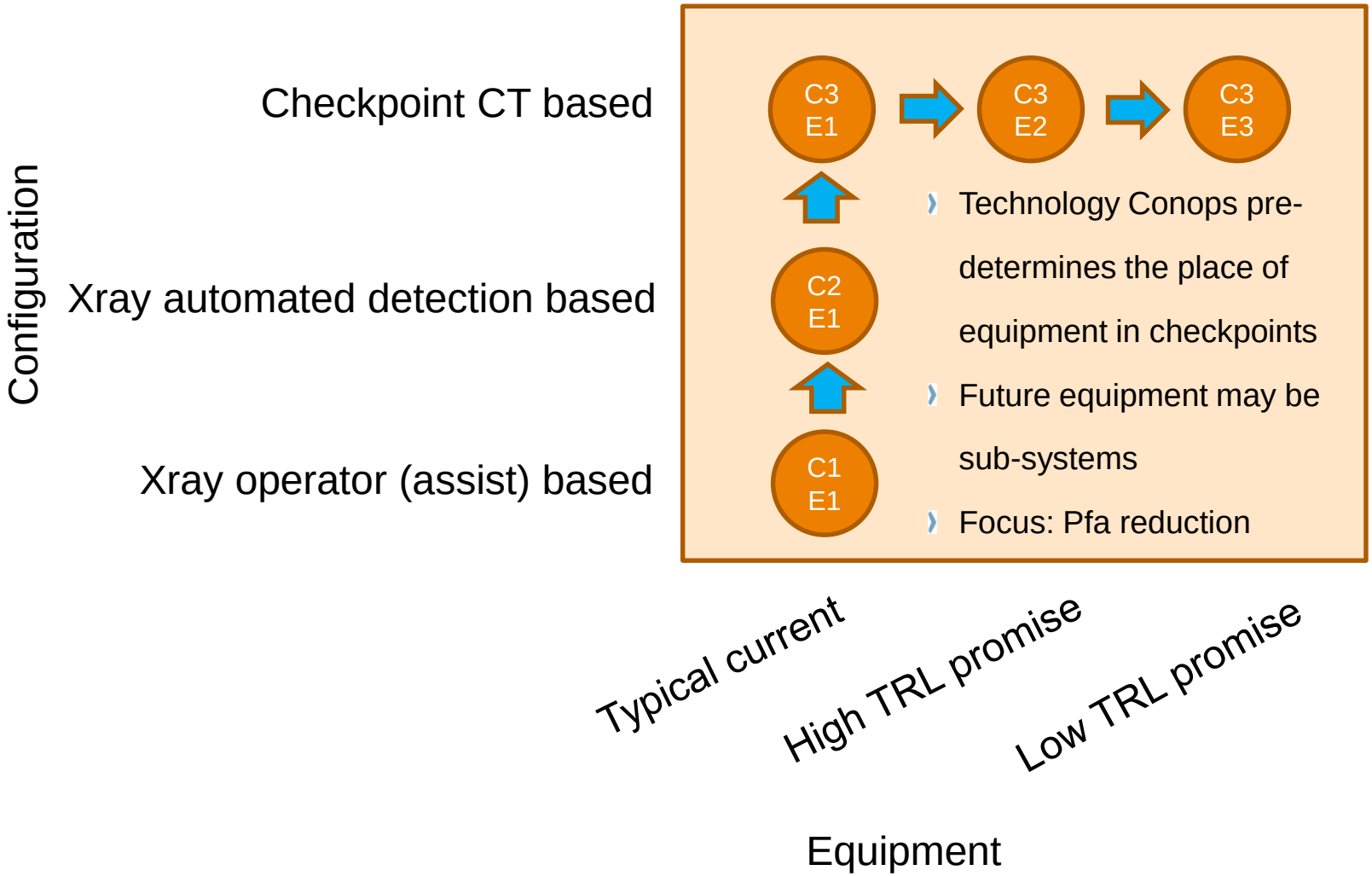
Policy drives acceptable Pd

Operation drives optimal Pfa

THE CHECKPOINT SYSTEM



This study: Sub-system for cabin baggage screening



INDICATIVE CONFIGURATION DETAILS

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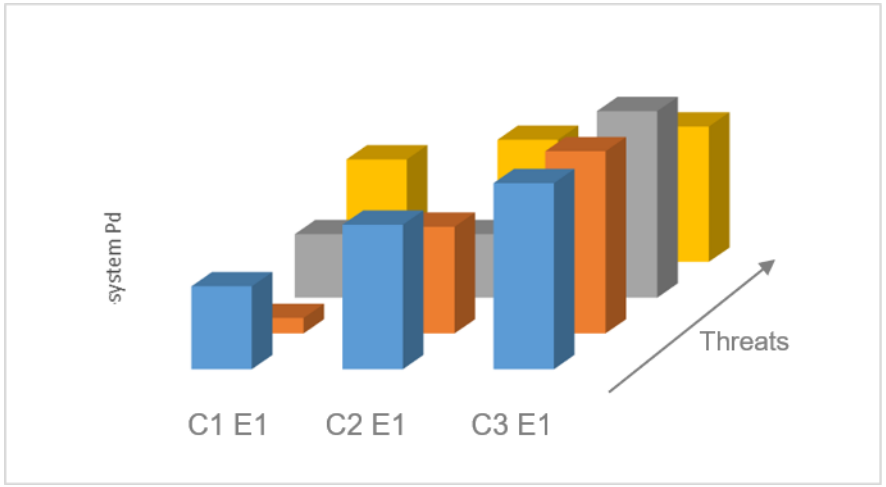
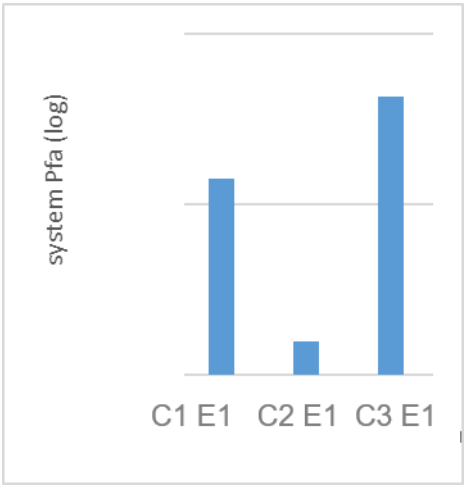
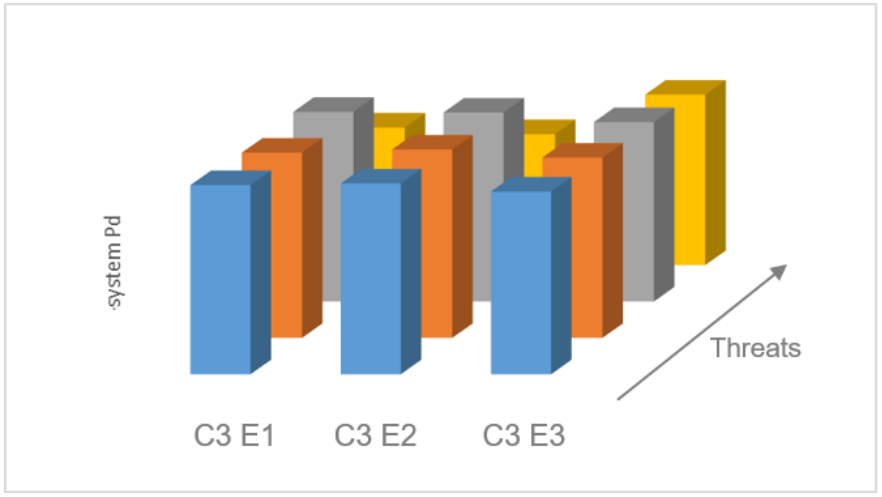
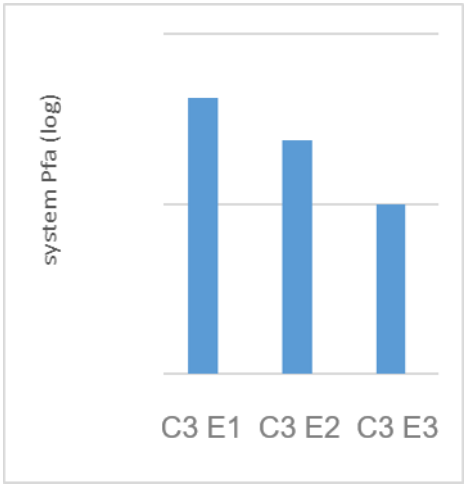
Code	DIvesting	Components
C1 E1	Pax divest LAGs	• COTS Xray and human screener (modeled as a subsystem) • Certain % ETD; COTS ETD • Hand search • Cascaded COTS detectors for LAGs screening
C2 E1	Pax divest LAGs	• COTS Xray incl. ATR-E • G/K human screener (modeled as a subsystem) • OSAR human screener (modeled as a subsystem) • Hand search • LAGS as C1 E1
C3 E1	None	• COTS CT incl. ATR • G/K human screener (modeled as a subsystem) • Hand search
C3 E2	None	• Best COTS CT incl. ATR, incl. XPC/XD fusion • G/K human screener (modeled as a subsystem) • Hand search
C3 E3	None	• Optimal CT/XPC/XD fusion, incl AI G/K ATR (subsystem) • Hand search


system Pd
Threats
C1 E1
C2 E1
C3 E1


system Pfa (log)
C1 E1
C2 E1
C3 E1


system Pd
Threats
C3 E1
C3 E2
C3 E3

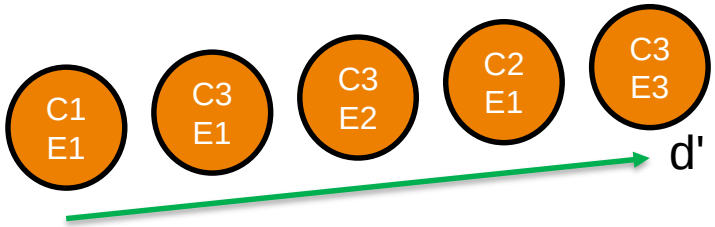

system Pfa (log)
C3 E1
C3 E2
C3 E3

CONCLUSIONS

- The checkpoint **system** needs to be considered in evidence based policy making in addition to individual equipment performance.
- The prediction model provides detailed and high level insight. Cost was not included in this analysis. Examples of carry-on screening were analysed.

- Different configurations for cabin baggage screening yield different and sometimes unexpected results.

Examples:



- The promise from short and long term technology development and fusion is mainly the **better system false alarm behavior**, while **high detection** can be maintained.
- The adversary is adaptive; we need to adapt by fusing technology developments into performing yet **flexible** smart system configurations.

THANK YOU FOR YOUR ATTENTION

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