Employee Password Usability Survey

Yee-Yin Choong

Visualization and Usability Group
Information Access Division
Information Technology Laboratory
National Institute of Standards and Technology

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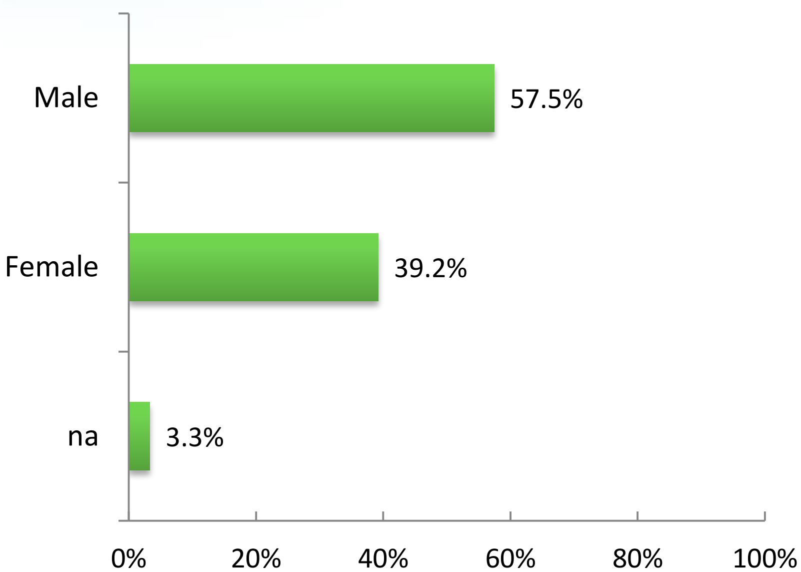
Employee Password Management

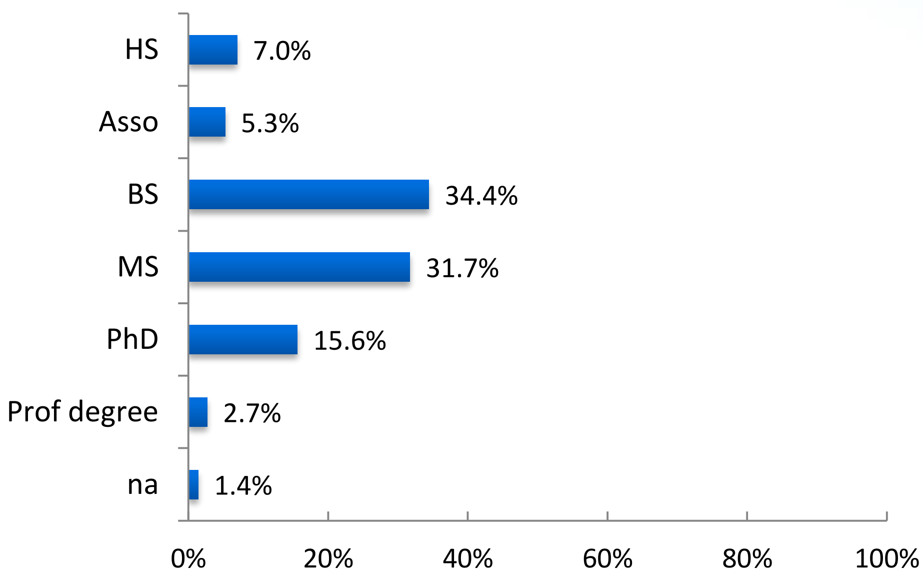
- **Online Survey**
  - Anonymous
  - Questions on password management and computer security
  - Demographics
- **US Government Workers**
  - 4,573 Department of Commerce (DOC) employees

Demographics

- **Gender**

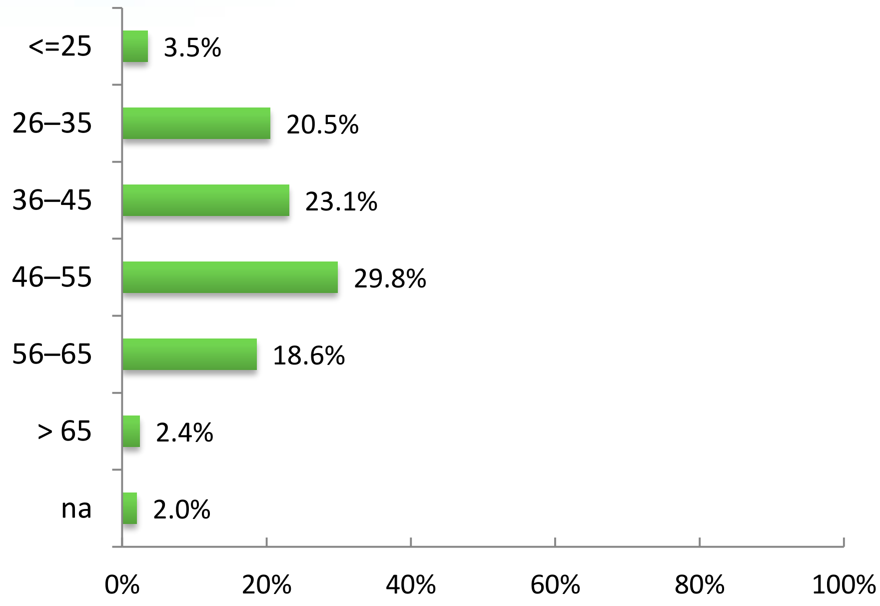


- **Education**

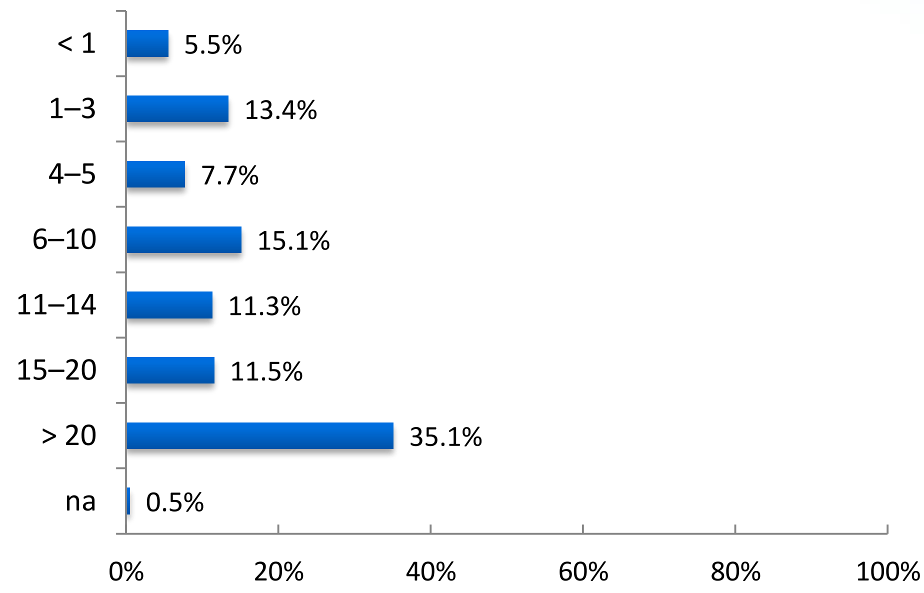


Demographics

- **Age** (years)

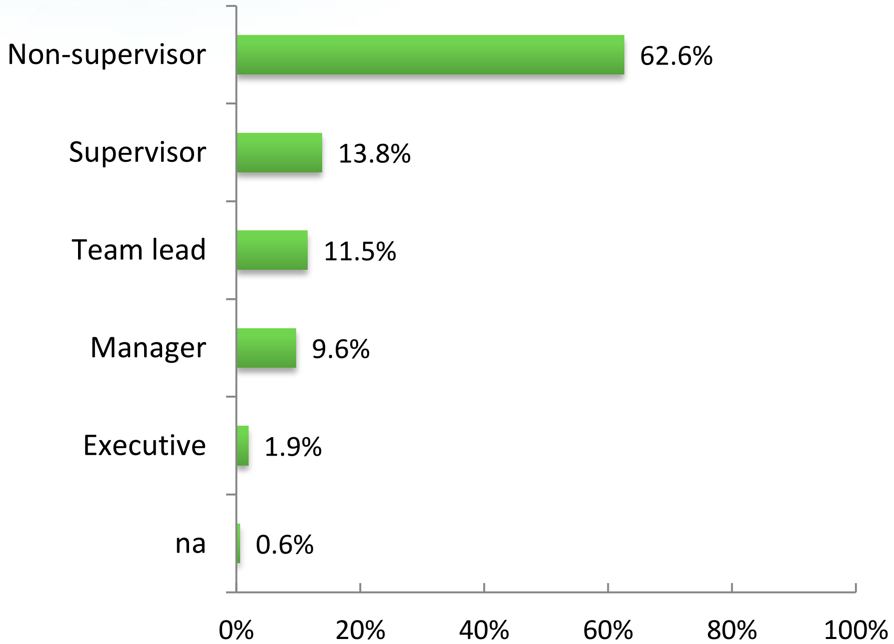


- **Service Length** (years)

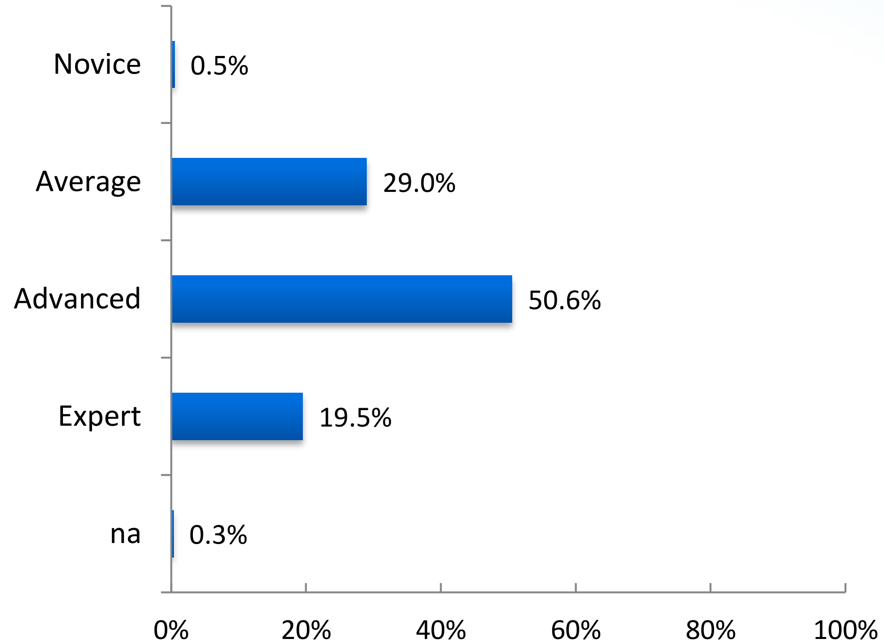


Demographics

- **Job Level**



- **Computer Experience**



Findings – Outline

- **Password Usage**
- **Attitudes toward Password Policy**
- **Password Management Lifecycle**
  - Generation
  - Maintenance
  - Authentication

Password Usage

- **Average 9 work-related passwords**
  - 5 frequently used
  - 4 occasionally used

- **Time spent on creating passwords**

Password Types	**Estimated Longest Time Total**[1] (Mean)	**Worst Scenario - time spent annually**[2] (with longest time)	
		Hours/employee/year If on a 90-day cycle	Hours/employee/year If on a 60-day cycle
Frequent passwords	98.5 min	6.6 h	9.9 h
Occasional passwords	86.6 min	5.8 h	8.7 h
	Total	**12.4 h**	**18.6 h**

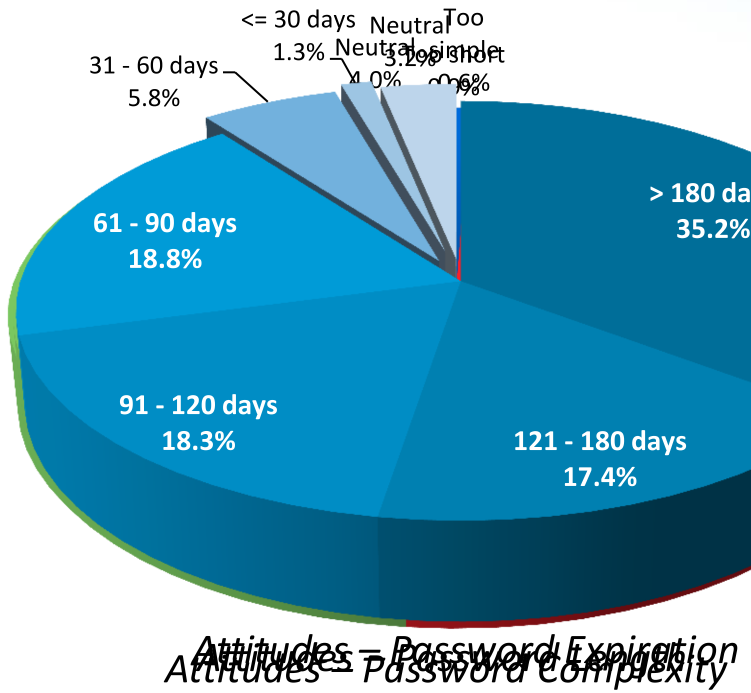
[1] Estimated Longest Time Total = (number of password counts) x (estimated longest time for a password)
[2] The calculation is based on the password changing cycle of 90 days (i.e. 4 times a year), and 60 days (i.e. 6 times a year).

Password creation takes long, why?

- *The program kept rejecting my password because it was not within the guildlines [sic] even though I thought I was following them.*
- *That 25 minutes was actual time trying to get a system to accept a password. I was so desparate [sic] I actually started asking colleagues for suggestions! .*
- *Longer if I manage to lock myself out in doing so, or can't remember what I just changed it to and have to get it reset all over.*
- *sometimes it's taken me 20min to change a password to one that meets the requirements and isn't too far off from my other ones (so I can remember it!)*
- *Longest time is 2 days. The password expired and a default password was set. I could not change away from the default due to a lock out feature requiring that the password not be changed more than once in two days.*
- *There have been several times where it took so long to create a complex enough password that I forgot the password when logging in the next time and had to have it reset.*

Attitudes toward Password Policy

- Too long
- Too complex
- Changed too often
  - not at the same time!



What did they say?

- *The combination of length/complexity, number of different passwords, plus frequent changes makes passwords insecure, because they must be written down.*
- *How do you think people remember extremely complex passwords which also require to be changed every 3 months ? #Wr1T31Td0wN .. yes that's 12 chars :)*
- *I understand that for ““security” ” reasons it is good to change a password - but seriously are we all expected to magically remember 12 different passwords, most of which are 10 charecters [sic] long, and can't look like a word (I agree with the reason for the complexity - it just hard on the user).*
- *I make a list of the password requirements for all accounts and make one that fits all of them.*
- *Security has become so complex, it's interfering with being able to do a job efficiently.*
- *It is hard enough to come up with a 12 or so string of unique characters every three months, let alone remember 10 individual ones.*
- *Security has become so complex, it's interfering with being able to do a job efficiently.*

Organizational Password Policy

- Protect data integrity and system security
- Control employees' access
- Dictate employees' password management
  - Password composition requirements
  - Password expiration
  - Reuse and history
  - Storage requirements

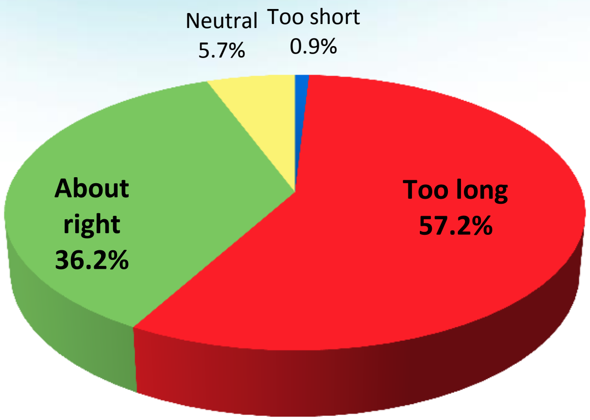
Employee Attitudes

- Attitudes (Fishbein & Ajzen, 1975)

  *"**Learned**, relatively enduring dispositions to respond in consistently favorable or unfavorable ways to certain people, groups, ideas, or situations."*

- Positive employee attitudes
  - combat negative reactions to organization-wide changes or policy viewed as unfavorable

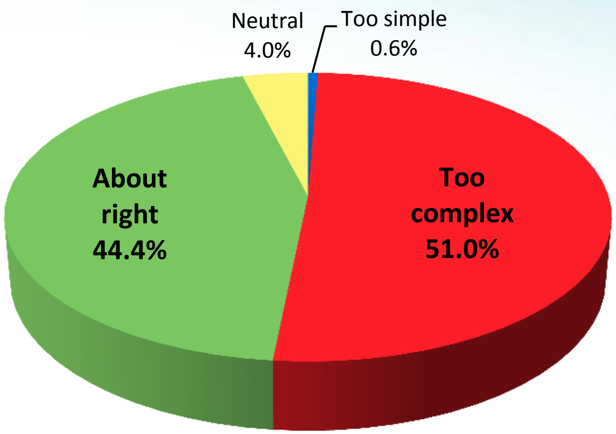
Divergent Views



Attitudes – Password Length

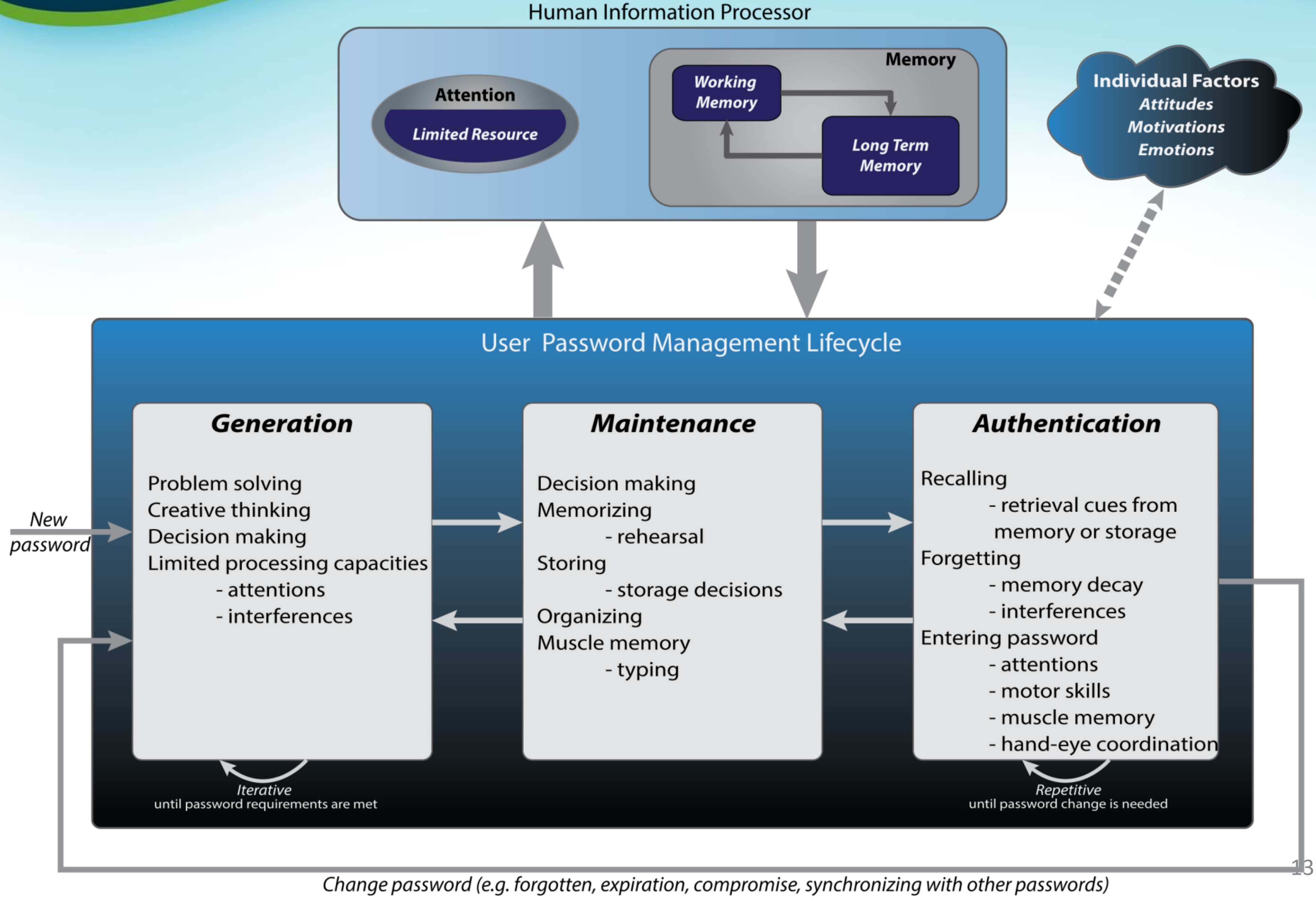
About Right

Burdensome



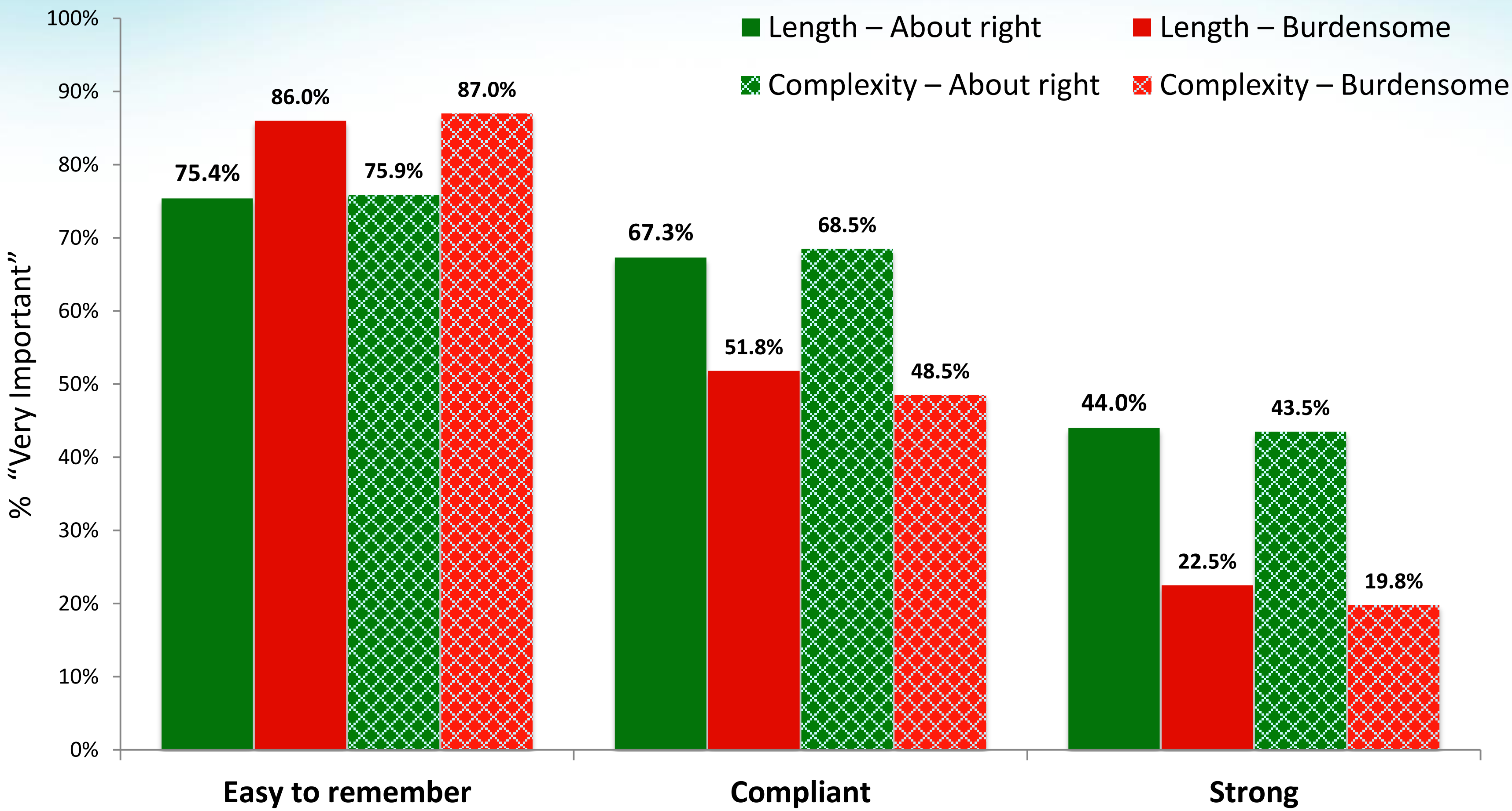
Attitudes – Password Complexity

Employee Password Management Lifecycle



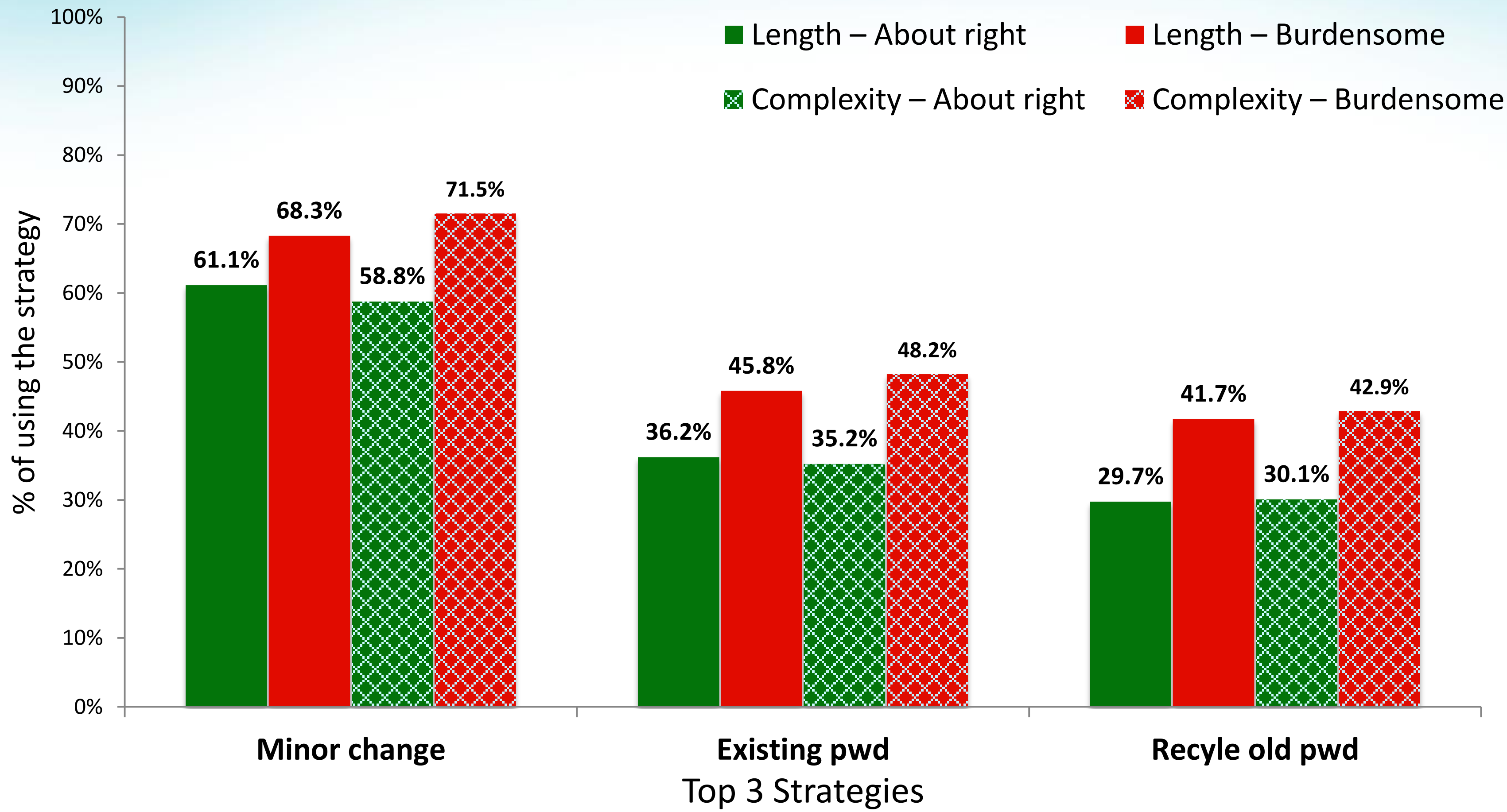
Human Information Processor
Attention
Limited Resource
Memory
Working Memory
Long Term Memory
Individual Factors
Attitudes
Motivations
Emotions
User Password Management Lifecycle
New password
Generation
Problem solving
Creative thinking
Decision making
Limited processing capacities
- attentions
- interferences
Maintenance
Decision making
Memorizing
- rehearsal
Storing
- storage decisions
Organizing
Muscle memory
- typing
Authentication
Recalling
- retrieval cues from memory or storage
Forgetting
- memory decay
- interferences
Entering password
- attentions
- motor skills
- muscle memory
- hand-eye coordination
Iterative
until password requirements are met
Repetitive
until password change is needed
Change password (e.g. forgotten, expiration, compromise, synchronizing with other passwords)

Password Generation Considerations



* All comparisons are statistically significant ($p < 0.05$).

Password Generation Strategies



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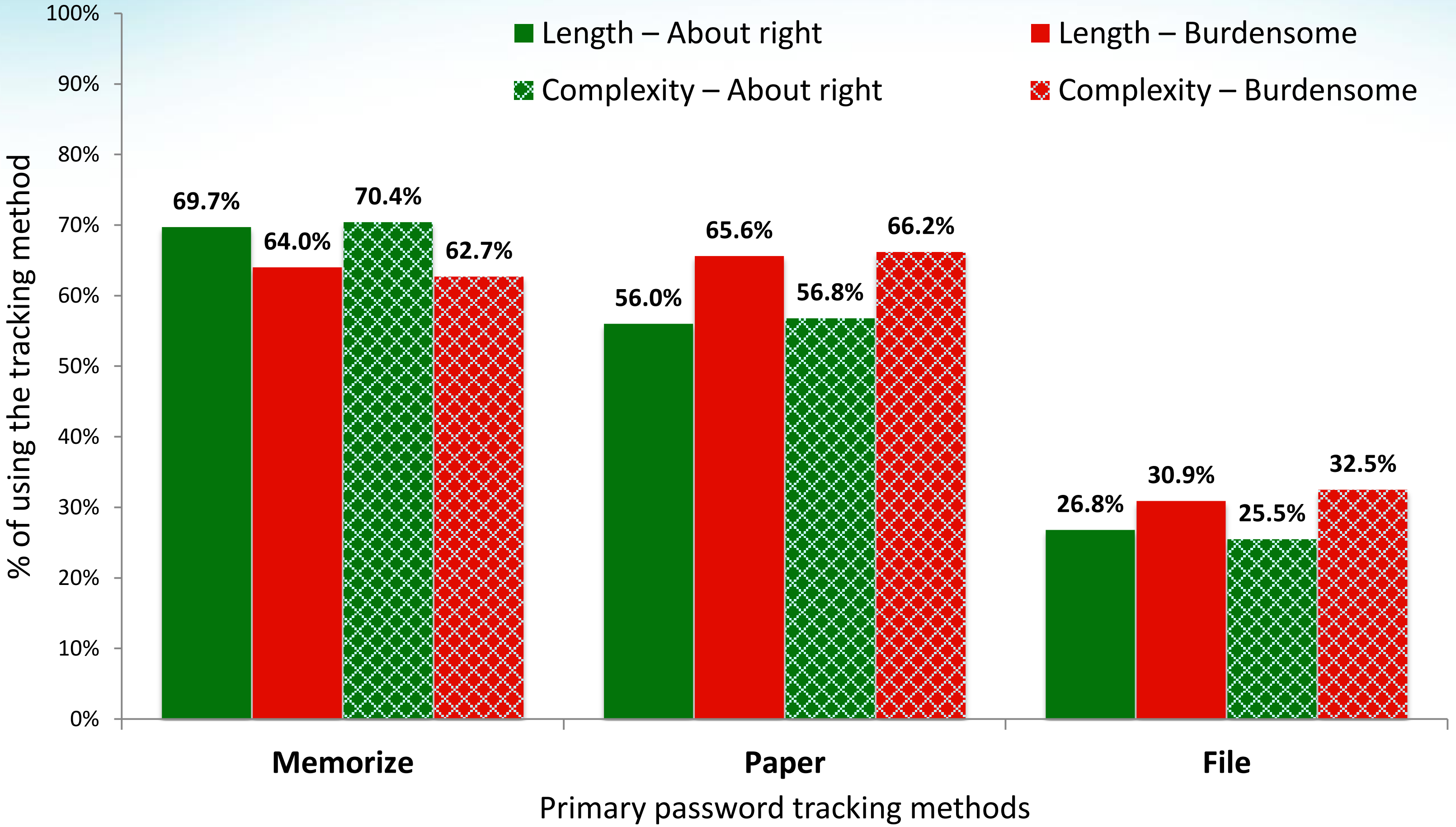
Password Maintenance



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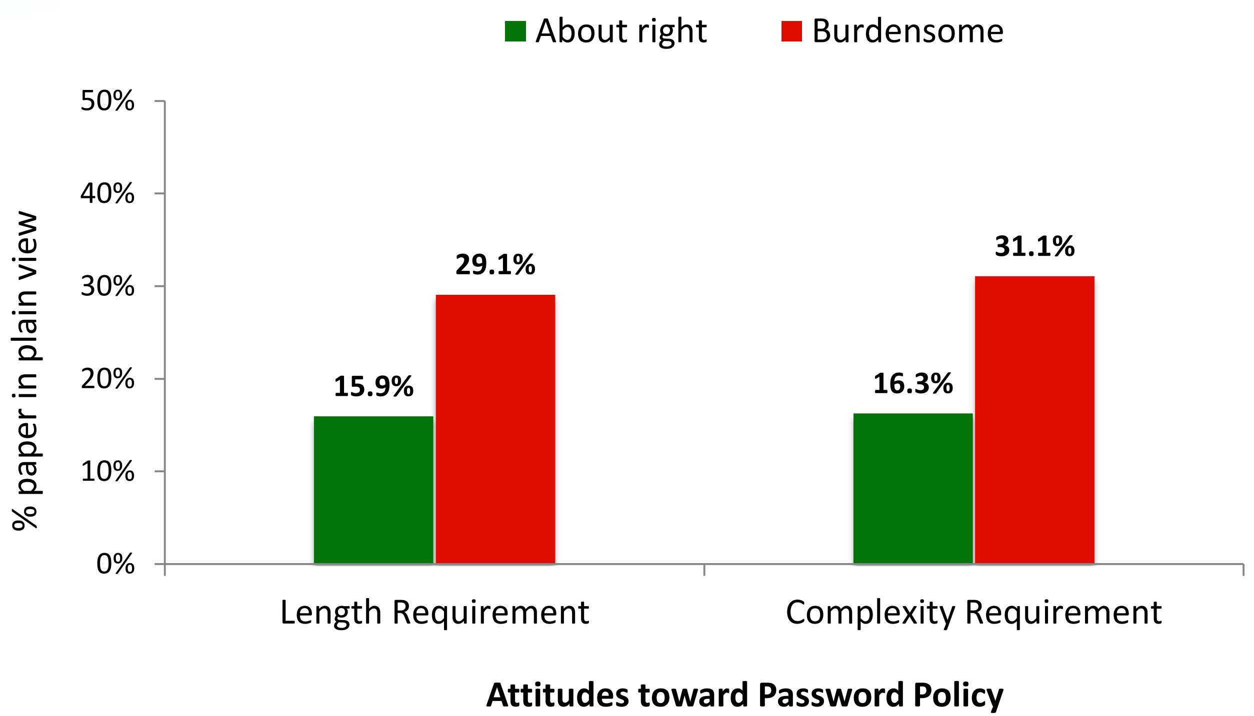
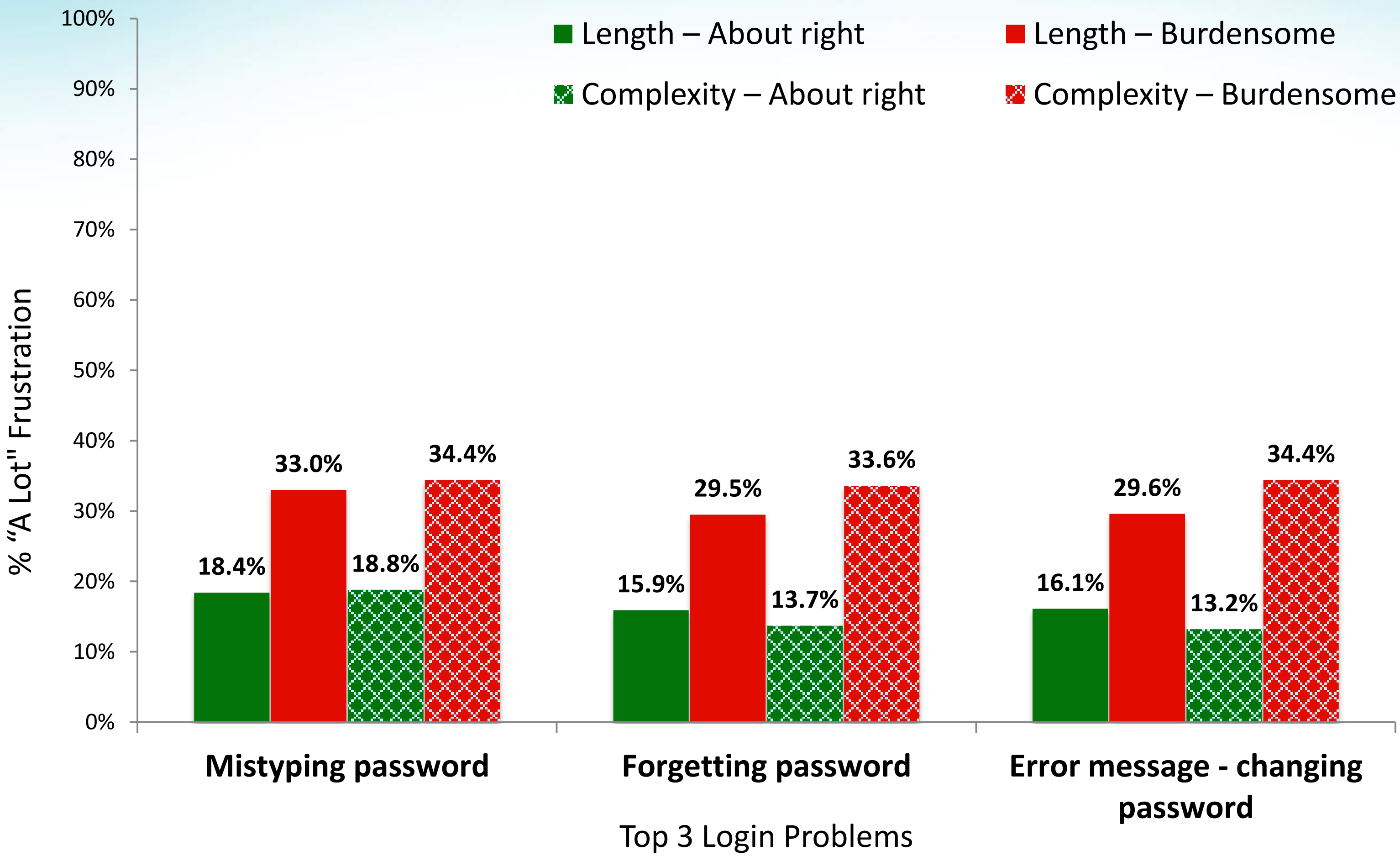
Password Tracking – paper in plain view

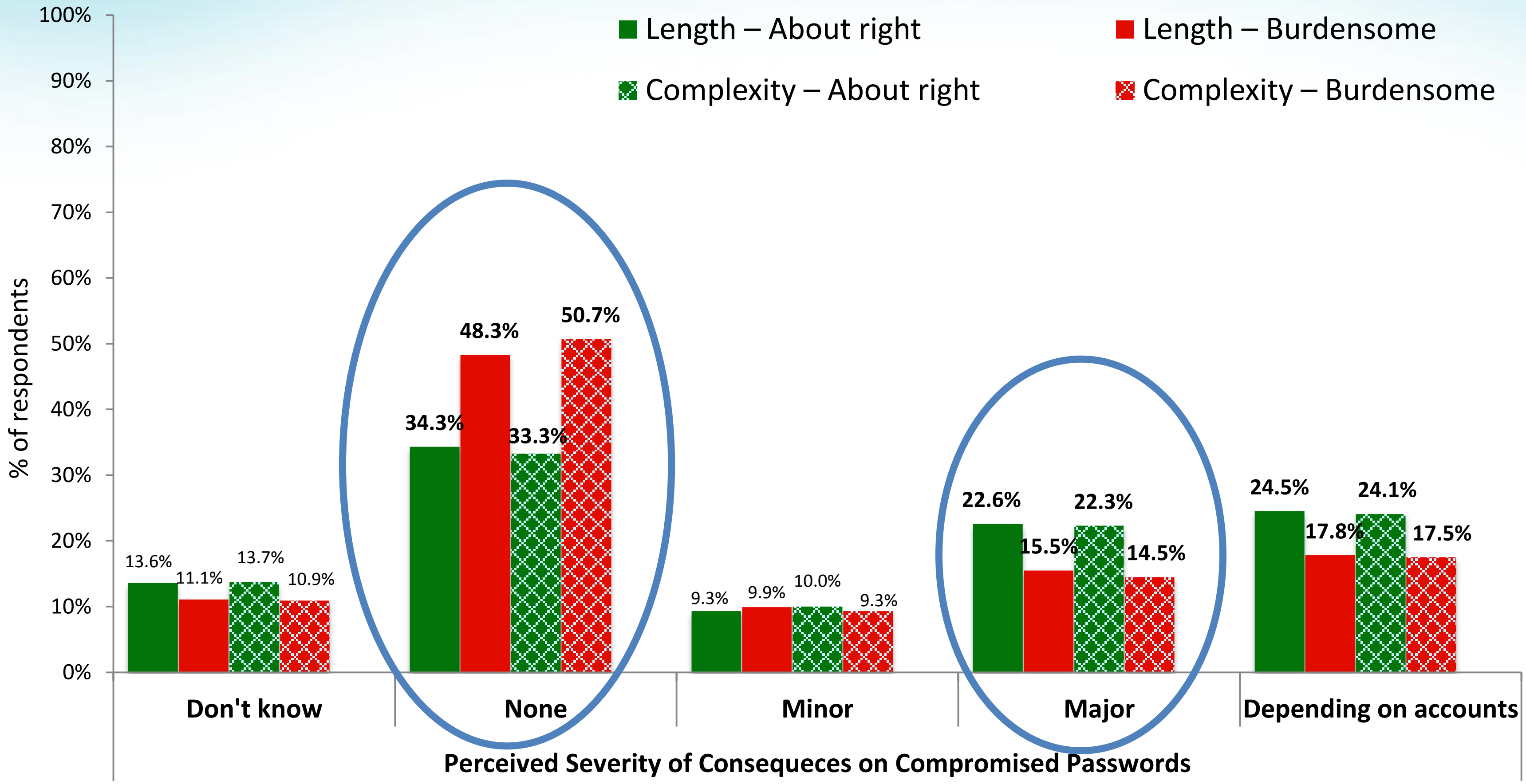


Authentication Experience



* All comparisons are statistically significant ($p < 0.05$).

Thoughts on Compromised Passwords



* Comparisons (*None, Major, Accounts dependent*) are statistically significant ($p < 0.05$).

What Did 4,500+ People Tell Us?

- *Staff overwhelmed – pushing human cognition limits*
  - different password requirements (length, complexity, expiration)
  - multiple passwords – frustration level significantly related to number of passwords
- *Statistically significant relationships*
  - Attitudes toward organizational security policies
  - Security behaviors and experiences
  - Positive attitudes
    - Compliant and strong passwords more important
    - Write-down passwords less often
    - Less frustration with login problems
    - Better understanding of password security

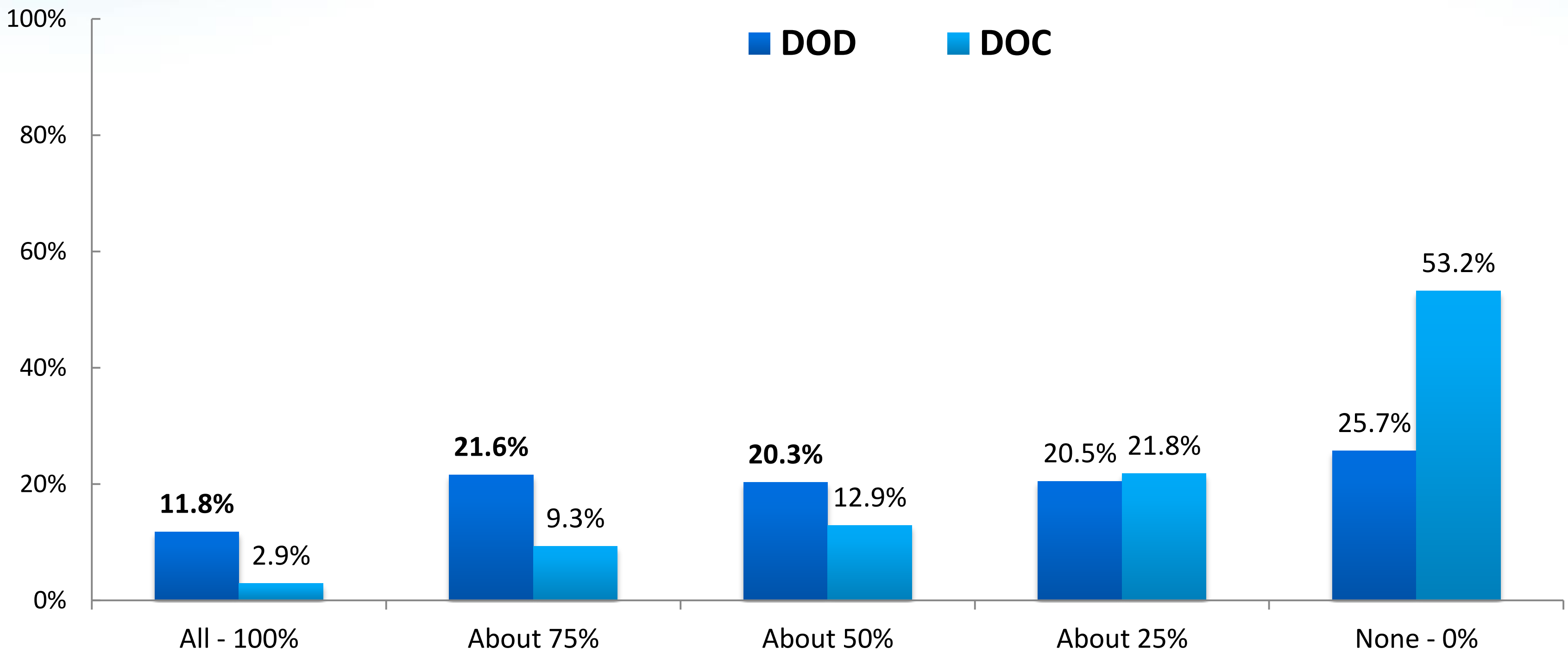
Promising Solution?

- Smart Cards for identification and authentication
- **Security**, multi-factors
  - Something you have – a Smart card
  - Something you know – a PIN
- **Usability**
  - Single sign-on
  - PINs easier to remember and to enter

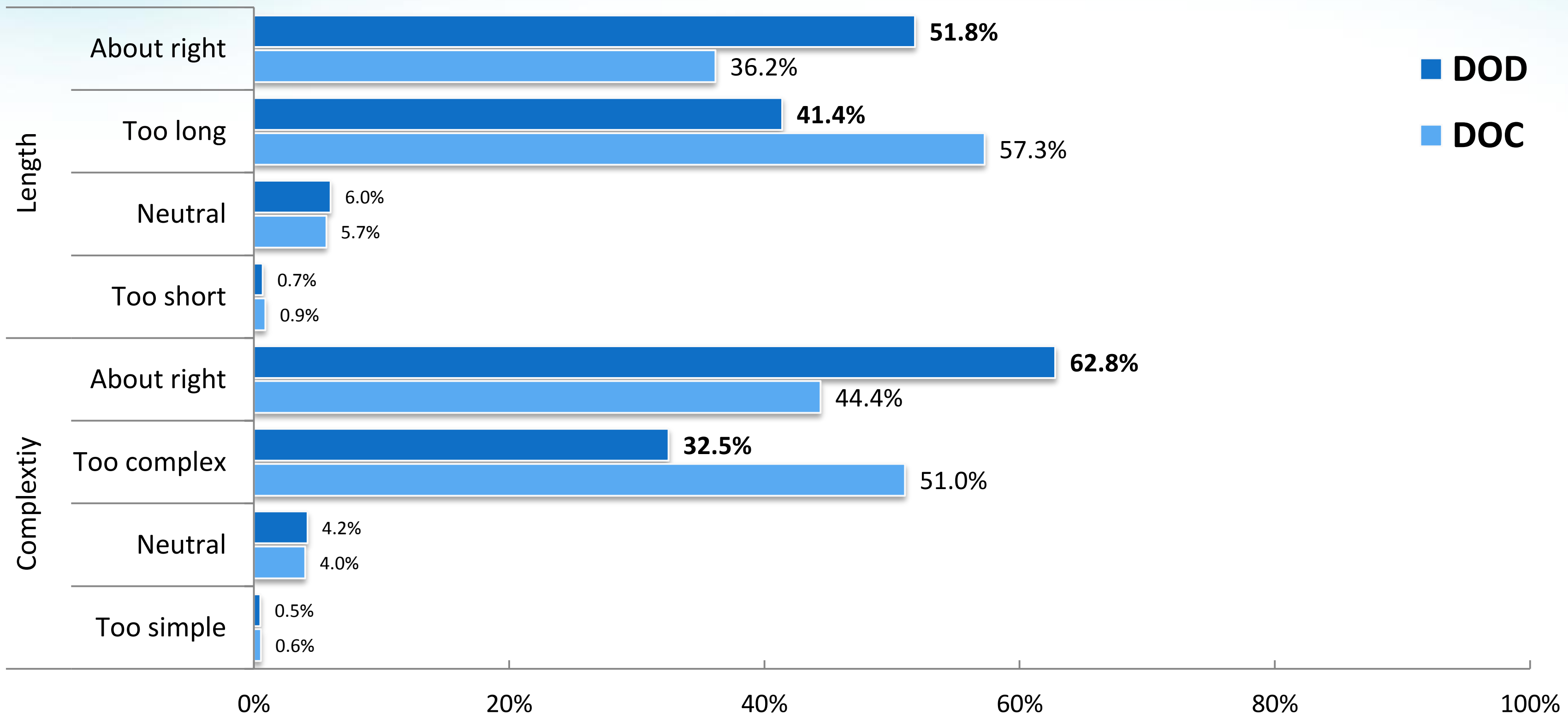
The case of CAC (Common Access Card)

- **CAC**
  - Standard identification for Department of Defense (DoD) personnel
  - Physical access
  - Logical access
- **Online Survey**
  - Anonymous
  - Questions on CAC usage and password management

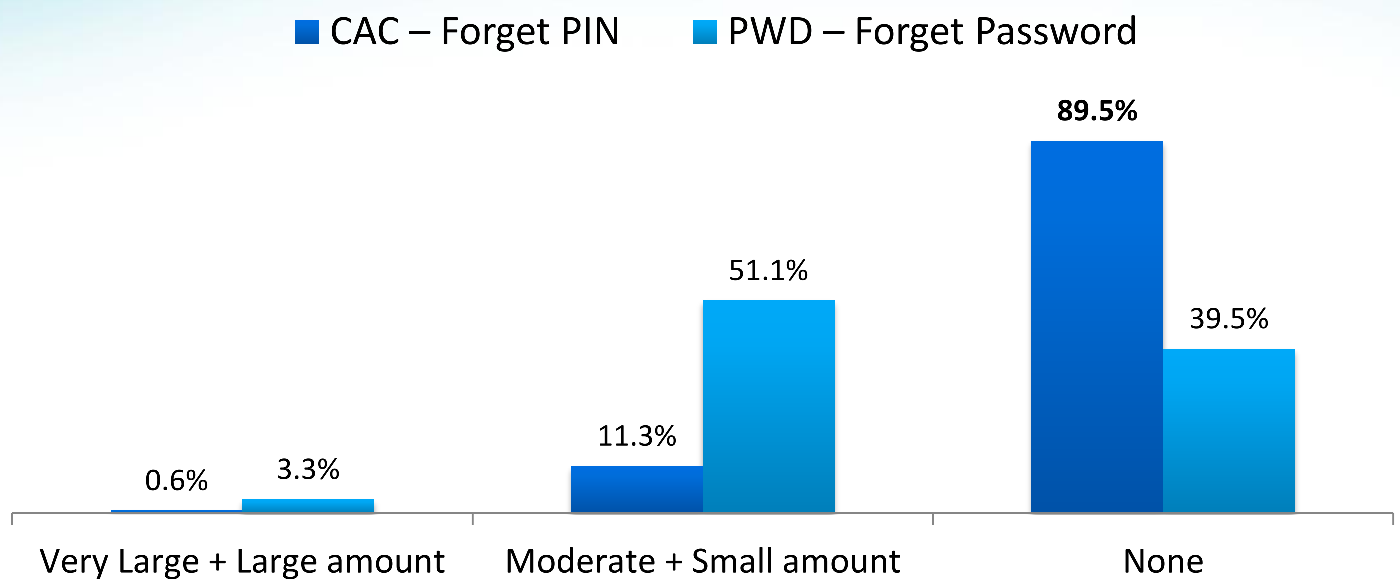
Single Sign-on Coverage



Attitudes toward Password Policy



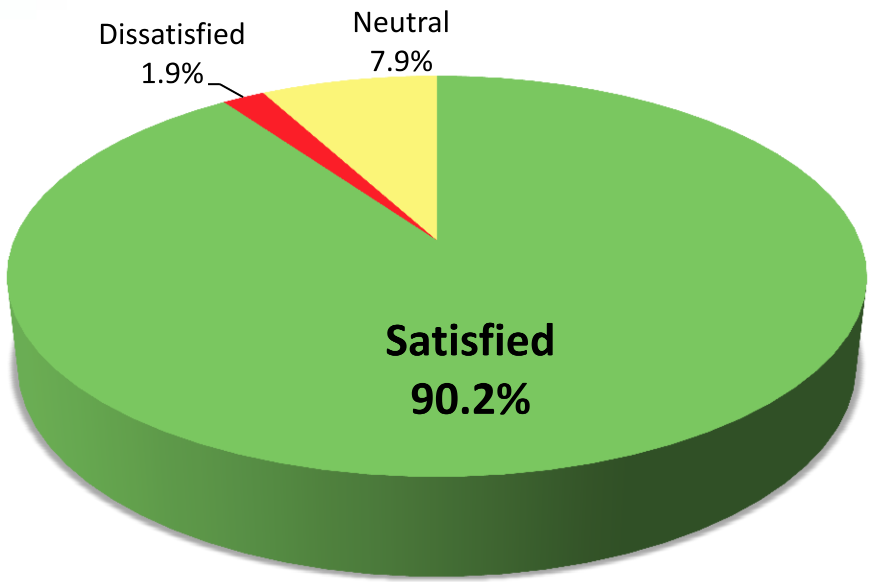
Authentication Problems – Forgetting



Frustration with Forgetting – DOD

- Statistical significance ($p < 0.05$)
  - More frustration with *Forgetting Password*

User Satisfaction with CAC



CAC benefits >> Passwords

- Fewer passwords to maintain, less forgetting
- Better attitudes
- Less frustration with authentication problems
- Time-saving
- High Satisfaction

Moving Forward

- Smartcards (e.g., PIVs, CACs) for authentication
- More research on
  - Direction of causality: *Attitudes* & *Behaviors*
  - Promote positive attitudes
  - Work and personal password management
  - Better organizational security policies

Q & A

Choong, Y. Y., Theofanos, M., & Liu, H.-K. (2014). *United States Federal Employees' Password Management Behaviors – A Department of Commerce Case Study,* NISTIR 7991

Choong, Y. Y. (2014). A cognitive-behavioral framework of user password management lifecycle. In *Human Aspects of Information Security, Privacy, and Trust* (pp. 127-137). Springer International Publishing.

Choong, Y. Y., & Theofanos, M. (2015). What 4,500+ people can tell you–employees' attitudes toward organizational password policy do matter. In *Human Aspects of Information Security, Privacy, and Trust* (pp. 299-310). Springer International Publishing.

Yee-Yin Choong

National Institute of Standards and Technology
Gaithersburg, MD, USA
Yee-yin.choong@nist.gov