TU Delft

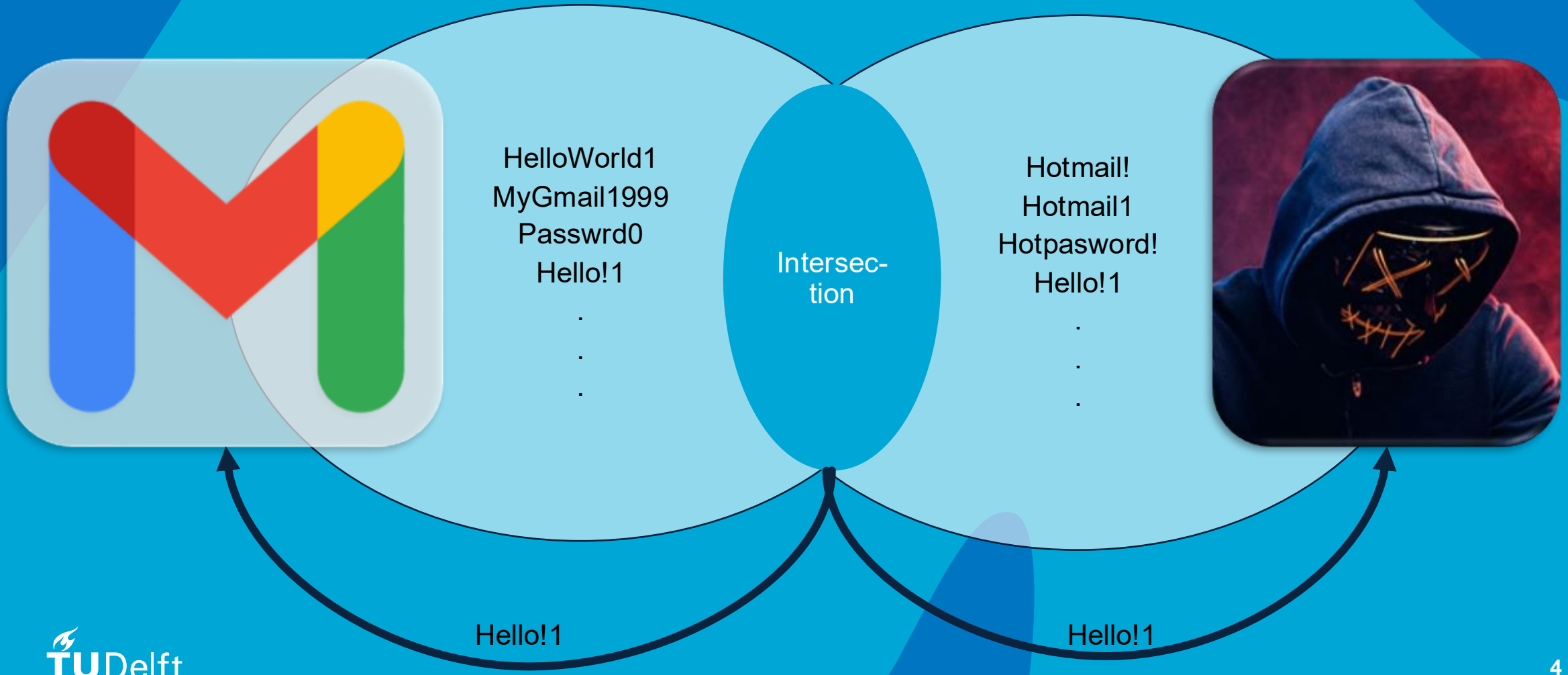
Prevent malicious input in PSI

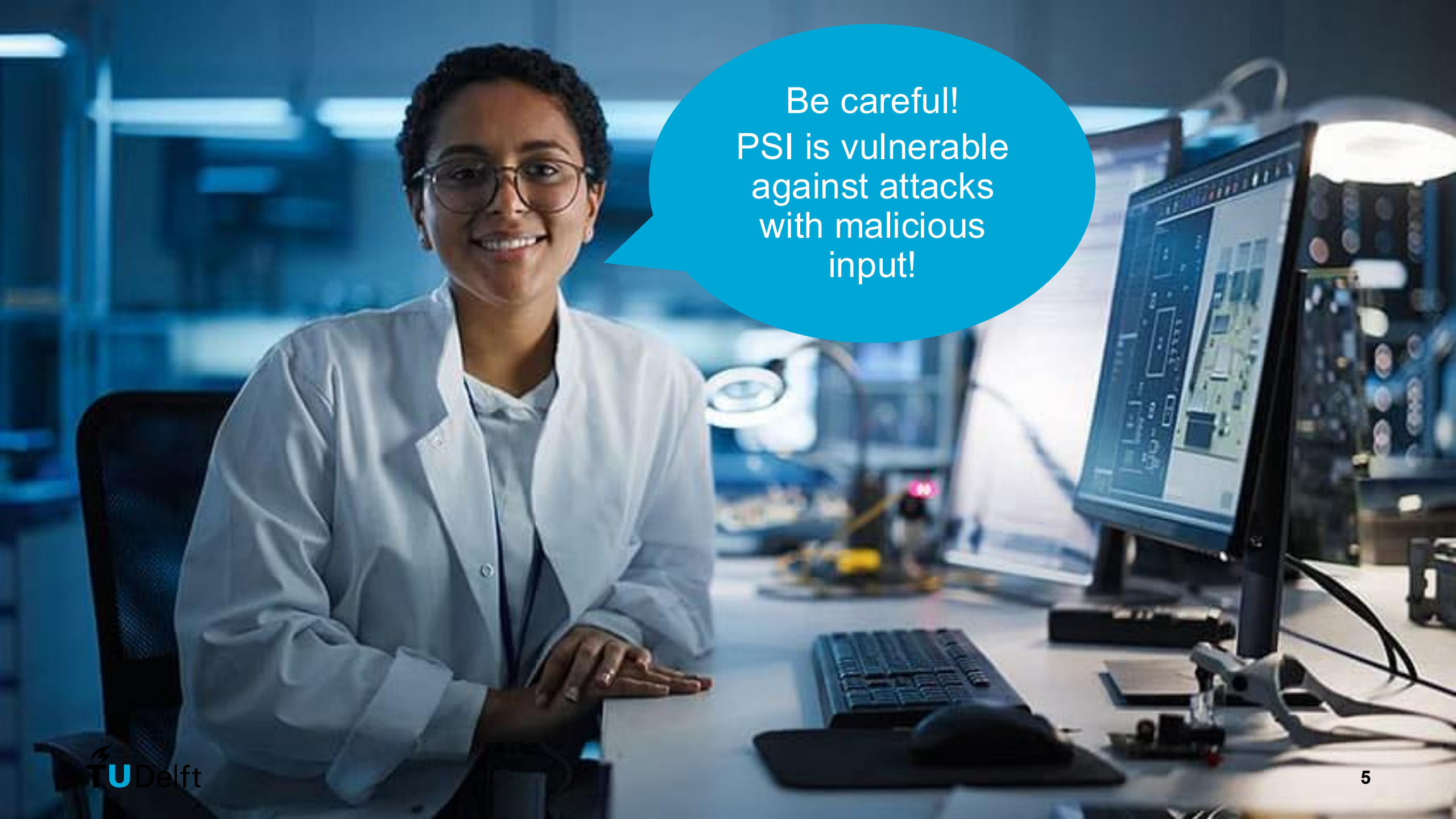
Partial Authorized Private Set Intersection as a solution | Tjitske Koster, PhD


Do my users use these passwords?
All passwords of Hotmail


I’m not crazy!
Let use PSI
Give your passwords and I’ll check doubles!

Private Set Intersection




Be careful!
PSI is vulnerable against attacks with malicious input!

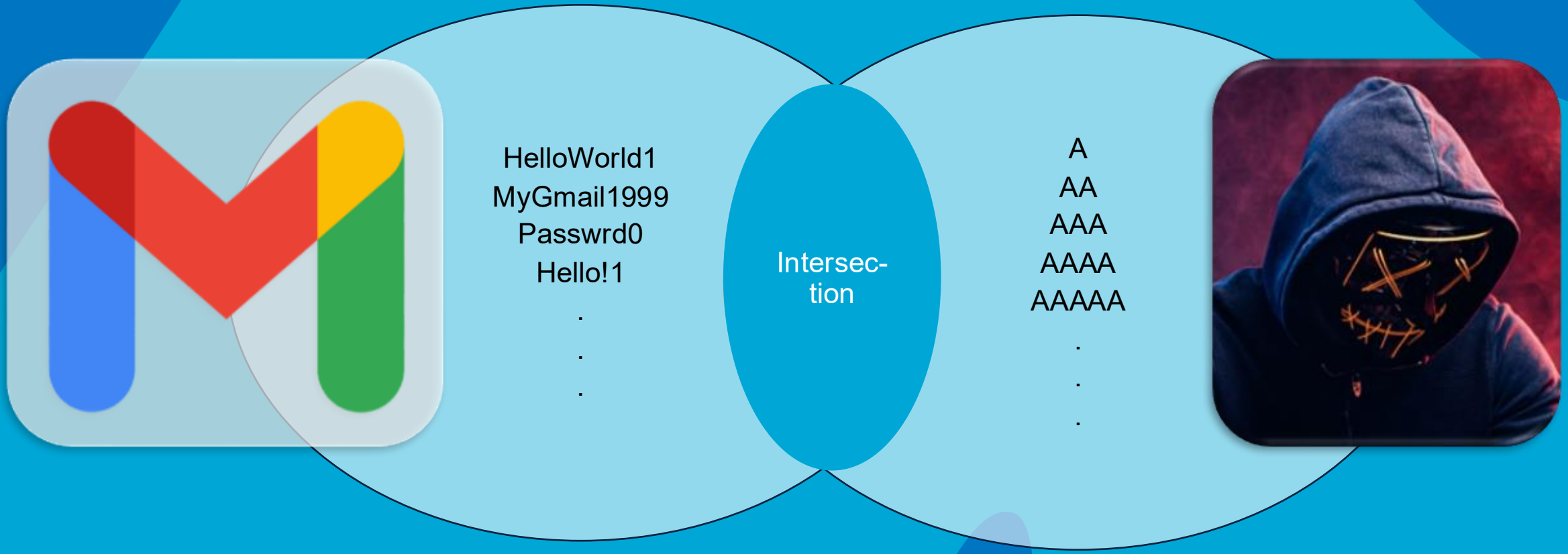
Background

Authorized Private Set Intersection

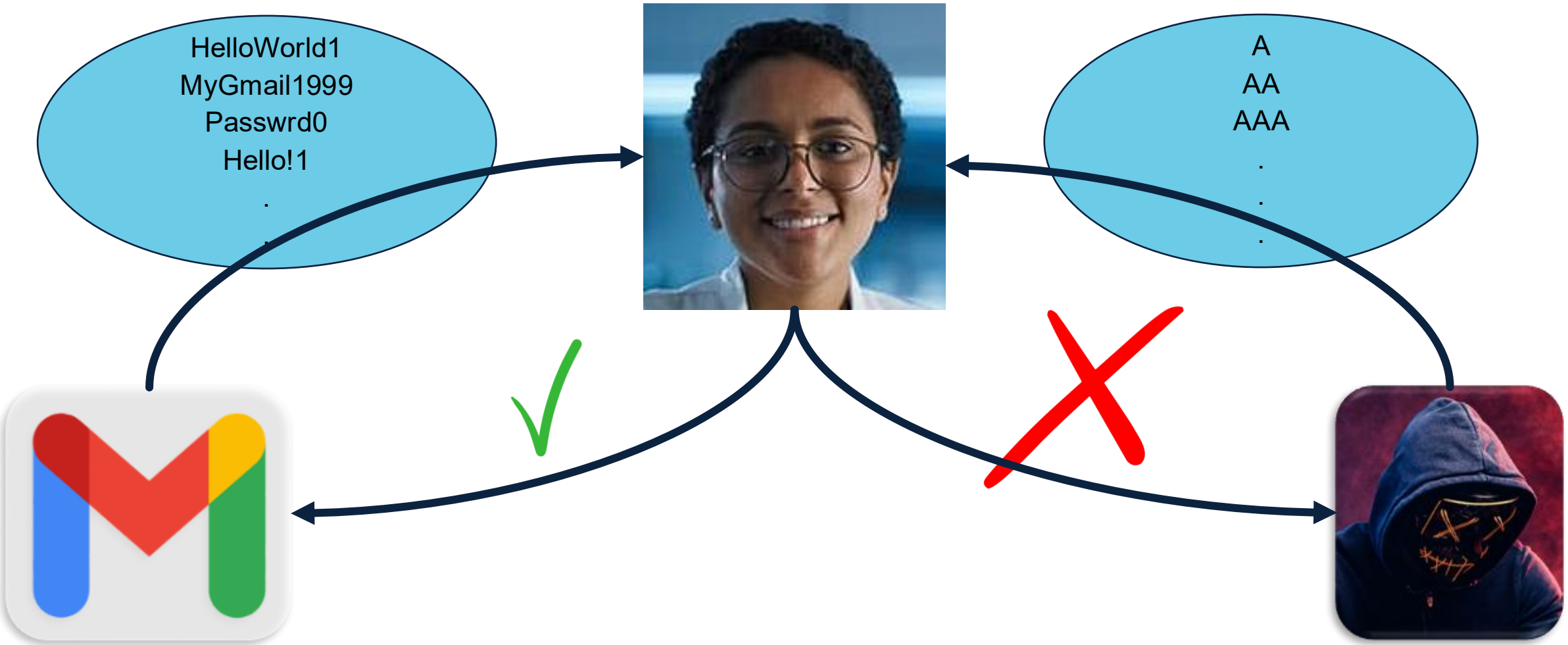
Problem and solution

Compare with previous work

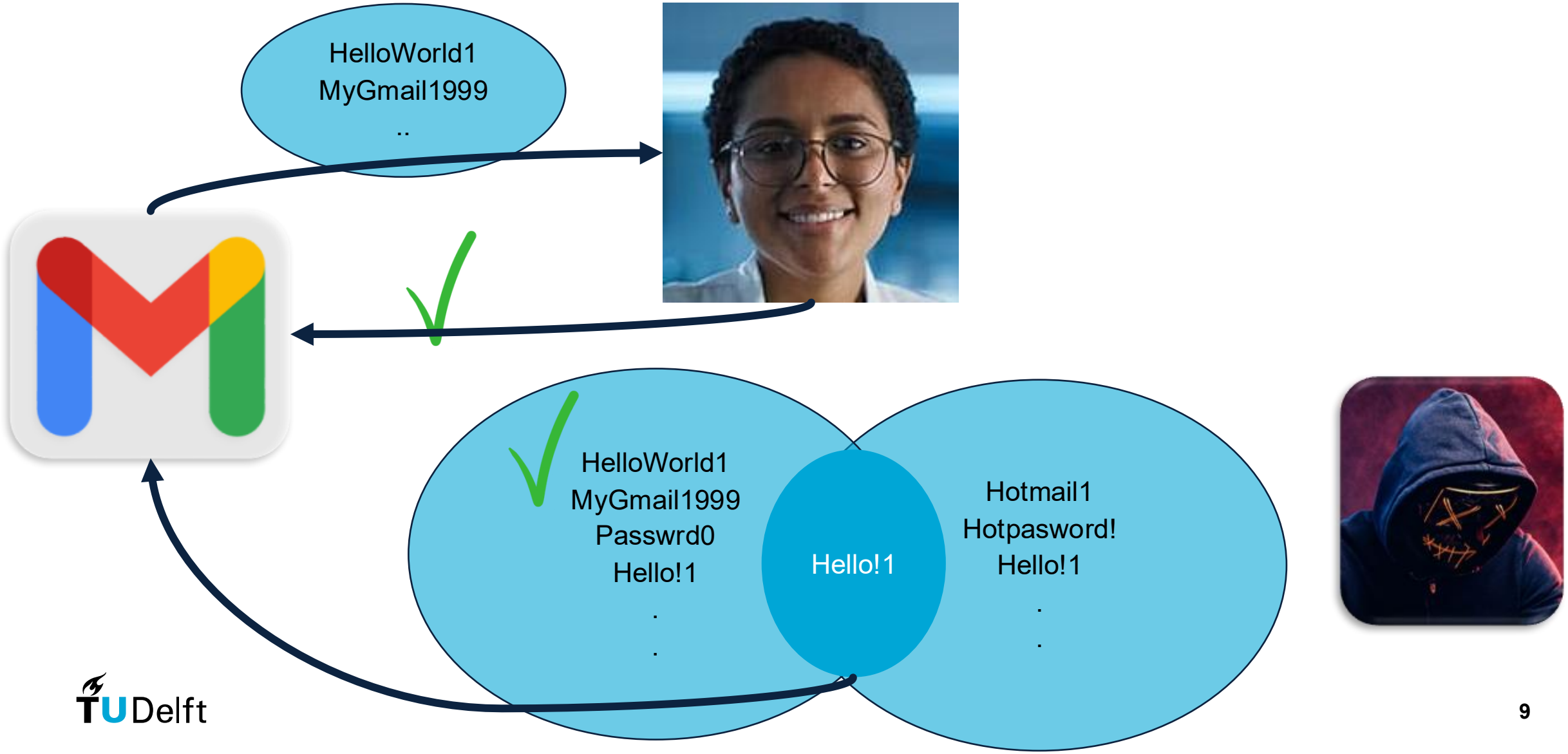
Membership Inference Attack



Authorized Private Set Intersection



Authorized Private Set Intersection

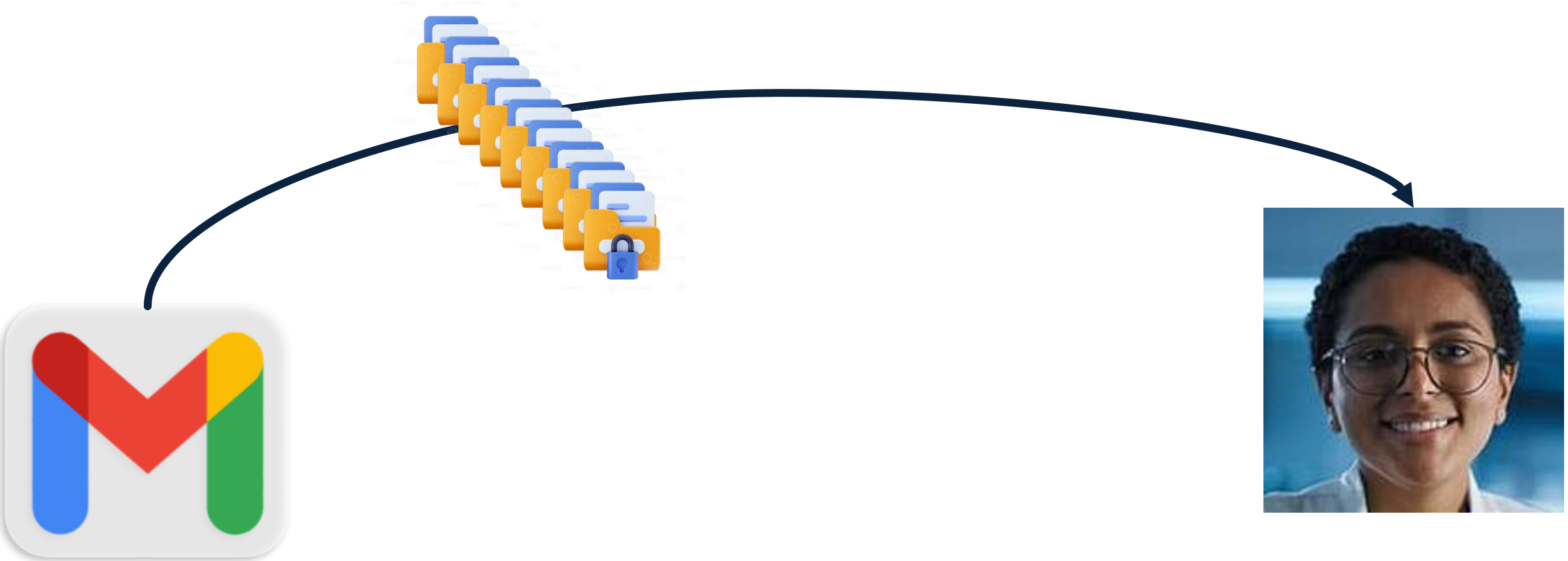


Problem!!!!

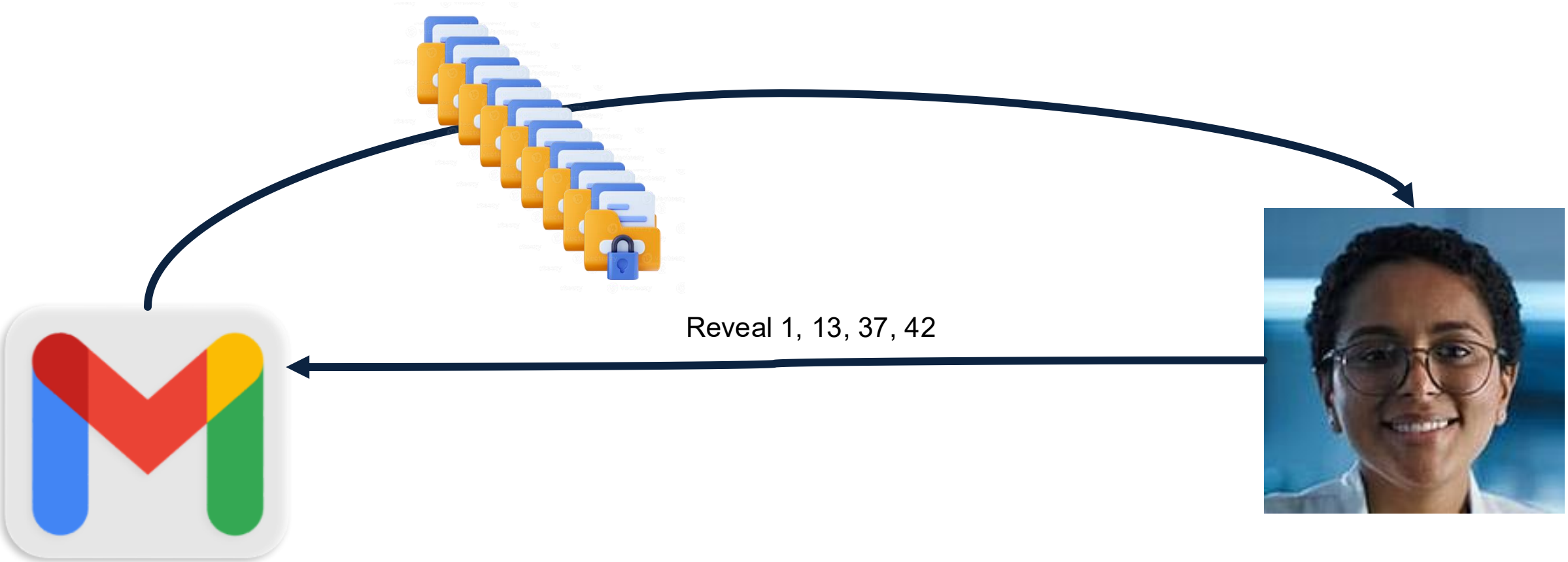
I don’t want to share all passwords!

How to solve this? Previous work

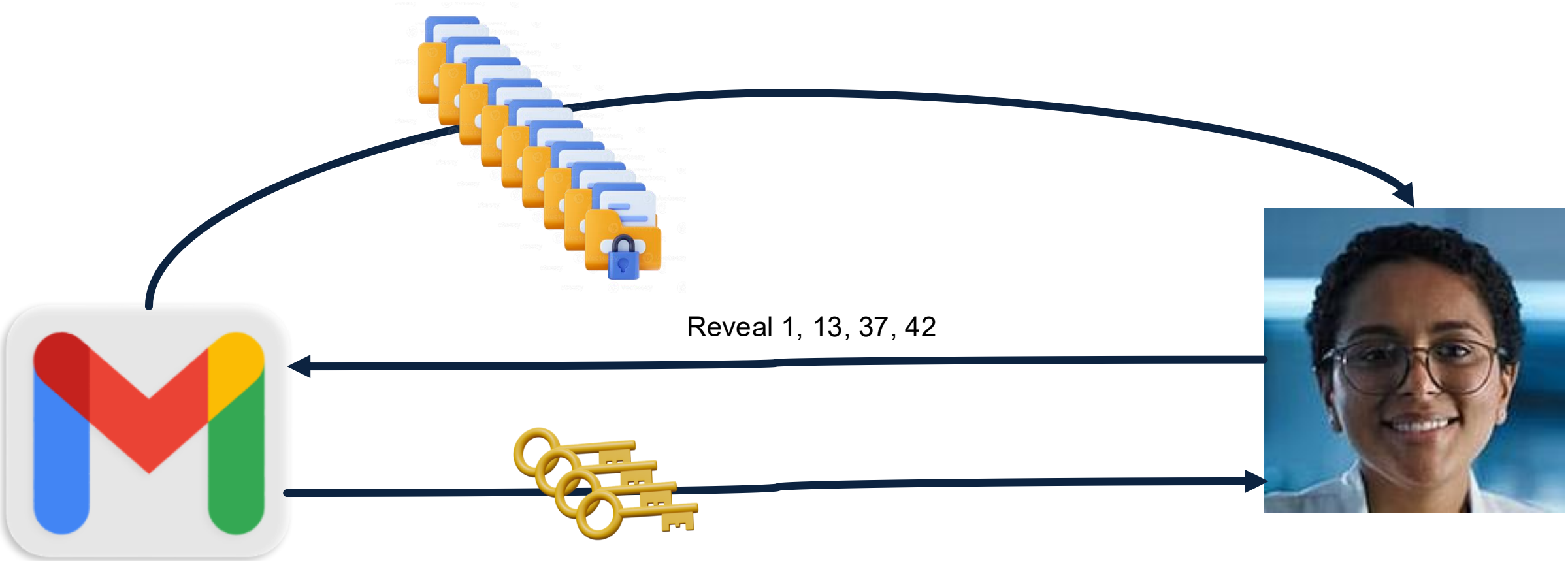
PARTIALLY Authorized Private Set Intersection



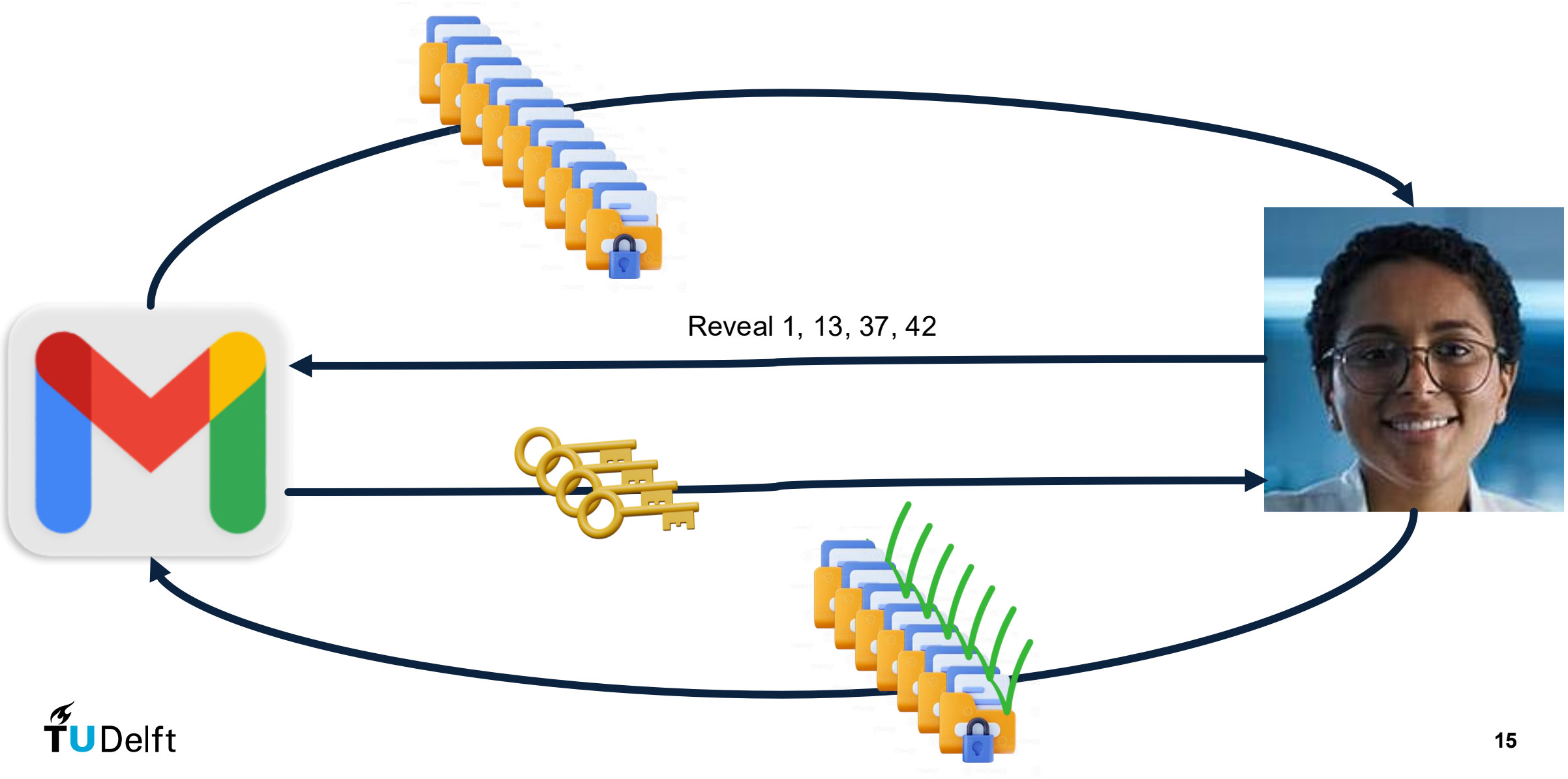
PARTIALLY Authorized Private Set Intersection



PARTIALLY Authorized Private Set Intersection

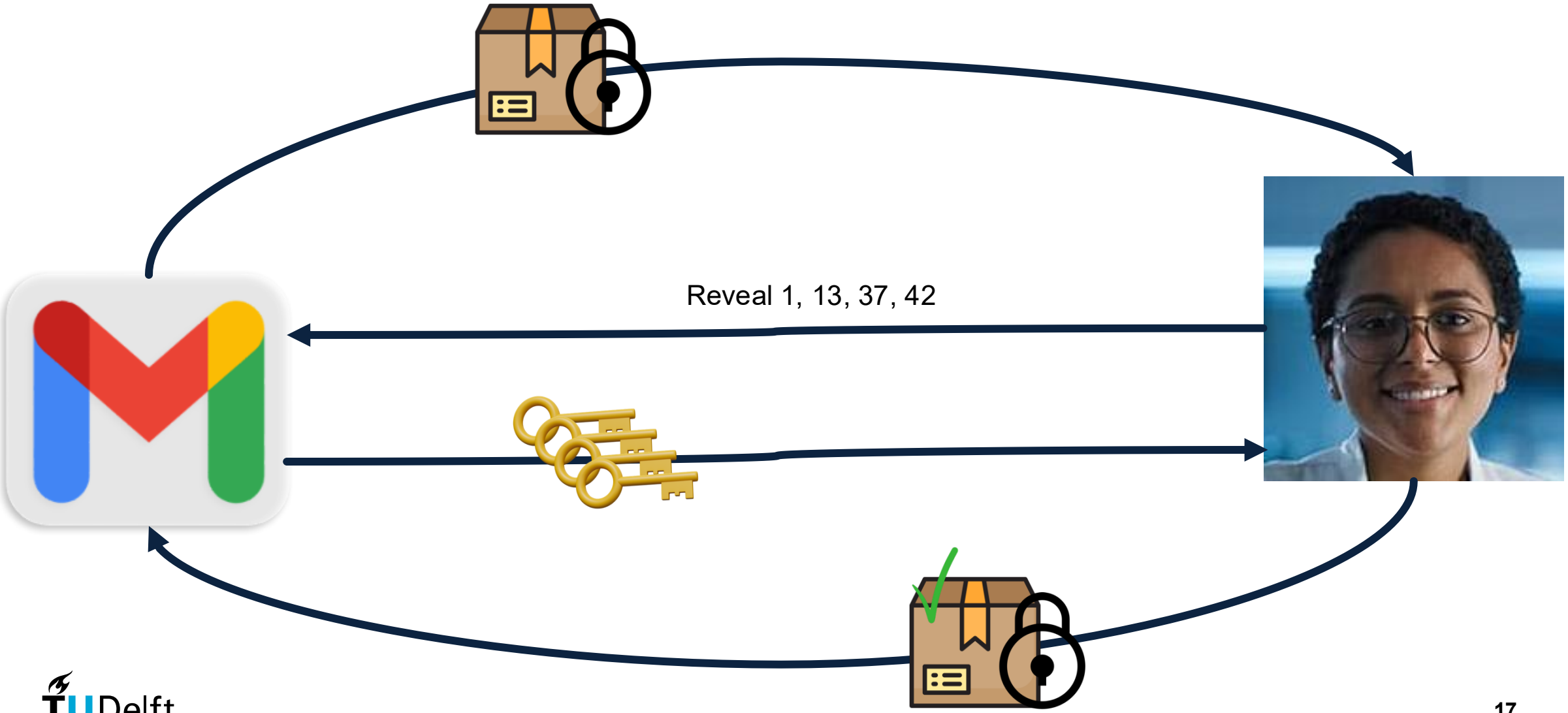


PARTIALLY Authorized Private Set Intersection

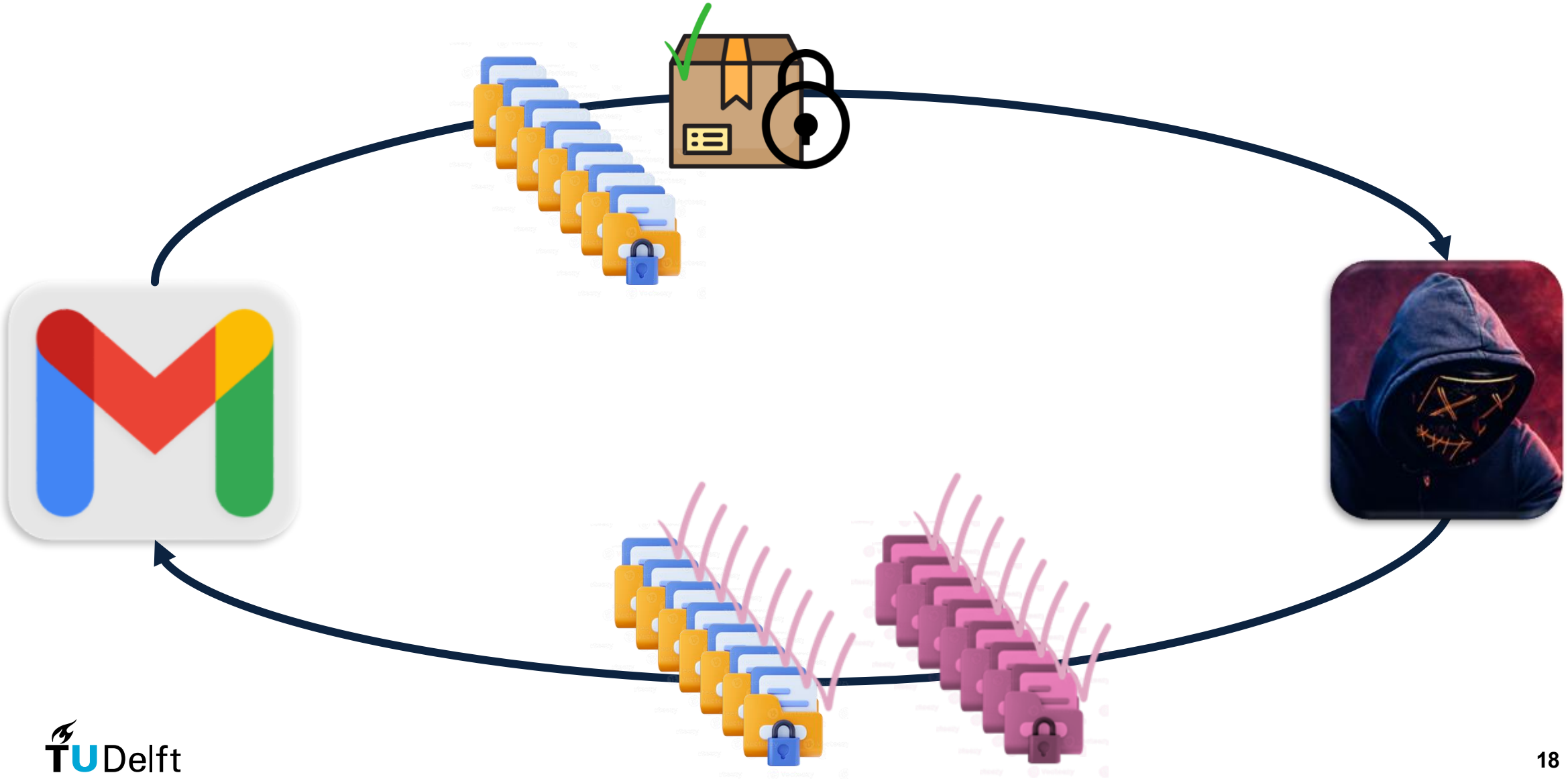


That is a lot of documents… We can do this smarter! New work

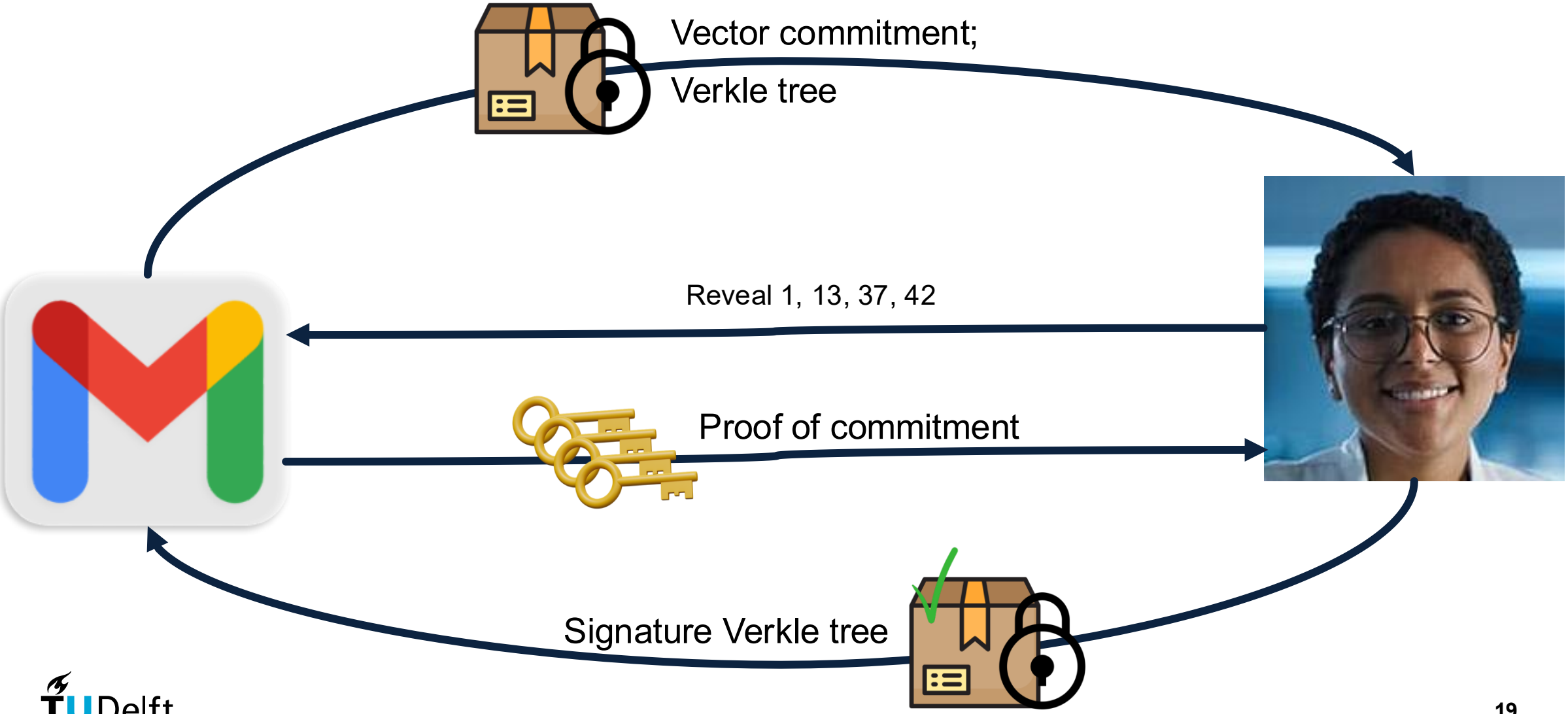
IMPROVED Partial Authorized PSI



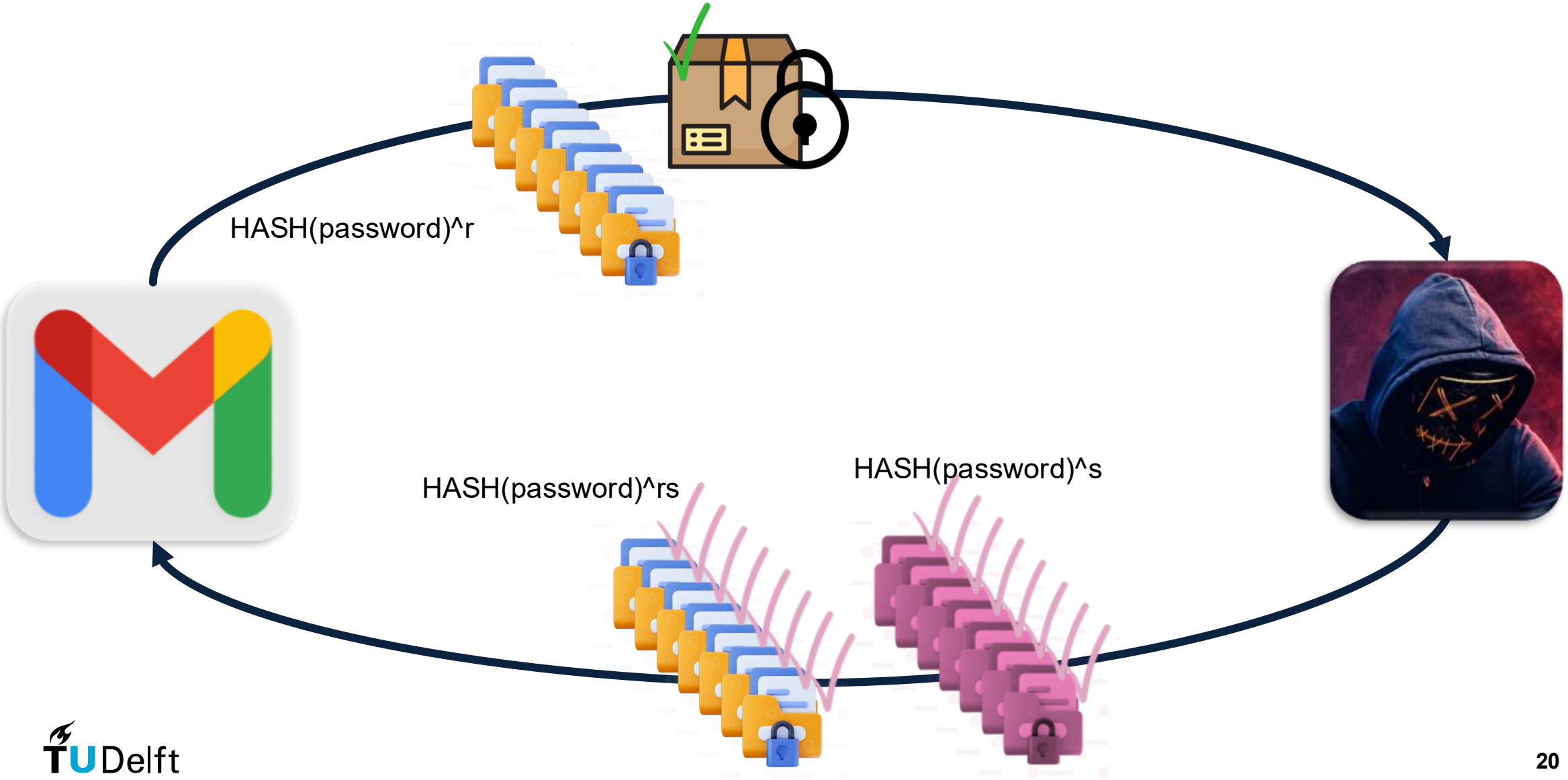
IMPROVED Partial Authorized PSI - Intersection



IMPROVED Partial Authorized PSI



IMPROVED Partial Authorized PSI - Intersection



Results

Set sizes		Scheme	Communcation (KB)		Runtime (ms)			Total Runtime			
n	m		Auth	Inter	$\mathcal{J}$	$\mathcal{C}$	$\mathcal{S}$	LAN	1Gbps	200Mbps	50Mbps
2^{10}	2^{10}	FM2025									
		Ours									
	2^{16}	FM2025									
		Ours									
	2^{20}	FM2025									
		Ours									
	2^{24}	FM2025									
		Ours									
2^{16}	2^{10}	FM2025									
		Ours									
	2^{16}	FM2025									
		Ours									
	2^{20}	FM2025									
		Ours									
	2^{24}	FM2025									
		Ours									
2^{20}	2^{10}	FM2025									
		Ours									
	2^{16}	FM2025									
		Ours									
	2^{20}	FM2025									
		Ours									
	2^{24}	FM2025									
		Ours									

To prevent Membership inference attacks in PSI
use Partially Authorized PSI!