



Biometric Encryption: A Privacy by Design Example for Achieving Citizen Trust

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**TURBINE Final Workshop
CryptoBiometrics for Enhanced Trusted ID Management: Dreams & Reality
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Overview

- **About Ontario's Data Commissioner**
- **Biometric Encryption: From Dream to Reality**
- **Privacy by Design (PbD): Achieving Citizen Trust**



Ann Cavoukian, PhD Ontario's Information and Privacy Commissioner

- Ensures that government organizations (provincial and municipal) comply with freedom of information and privacy laws in Ontario
- Investigates privacy complaints and resolve appeals when the government refuses to grant access to government-held information
- Conducts research on access and privacy issues
- Educates the public and raise awareness about Ontario's access and privacy laws





IPC: Privacy and Biometrics

- 1994 - Proposed biometric program & legislation to combat welfare fraud (City of Toronto, Canada)
- 1999 – Privacy and Biometrics (IPC publication)
- 2003 – Statement to Federal Government on Privacy Implications of a National Identity Card & Biometric Technology
- 2005 – 27th Conference of International Data Protection & Privacy Commissioners (Montreux Declaration)

P_bDIPIC: Privacy and Biometrics (cont'd)

- 2005 – 27th Conference of International Data Protection & Privacy Commissioners (Montreux Declaration)
- 2005 – Membership on European Biometrics Forum, International Biometric Advisory Committee (EBF/IBAC)
- 2007 – White paper on Biometric Encryption (BE)
- 2007 – Review of Ministry of Transportation testing on photo comparison technology



PbDIP: Privacy and Biometrics (cont'd)

- 2008 – Comment on Ontario Government photo card legislation (including Enhanced Driver's License)
- 2008 – Tipsheet on Questions to ask before deploying fingerprint biometric systems & General primer on privacy and fingerprint biometrics
- 2009 – Joint Discussion Paper with EBG on Biometrics for Authentication Purposes and the Relevance of Untraceable Biometrics and BE
- 2010 – Report on Privacy-protective facial recognition technology in a Casino context



P_bDIPC: Privacy and Biometrics (cont'd)

- A. Cavoukian and A. Stoianov, “Biometric Encryption: The New Breed of Untraceable Biometrics”, in Biometrics: fundamentals, theory, and systems, Ch. 26, N. V. Boulgouris, K. N. Plataniotis, and E. Micheli-Tzanakou, Eds. London: Wiley-IEEE Press, 2009, pp. 655-718.
- A. Stoianov, T. Kevenaar, and M. Van der Veen, “Security Issues of Biometric Encryption”, in IEEE TIC-STH Symp. Information Assurance, Biometric Security and Business Continuity, Sept. 2009. Toronto, Canada, 2009, pp. 34-39.
- A. Stoianov, “Cryptographically secure biometrics”. Proc. SPIE, Vol. 7667, pp. 76670C-1 - 76670C-12 (2010).
- A. Stoianov, “Security of Error Correcting Code for Biometric Encryption (critical note)”. In Eighth Annual International Conference on Privacy, Security and Trust (PST 2010), Ottawa, August 17 – 19, 2010. pp. 231 – 235.



Advantages of Biometric Encryption

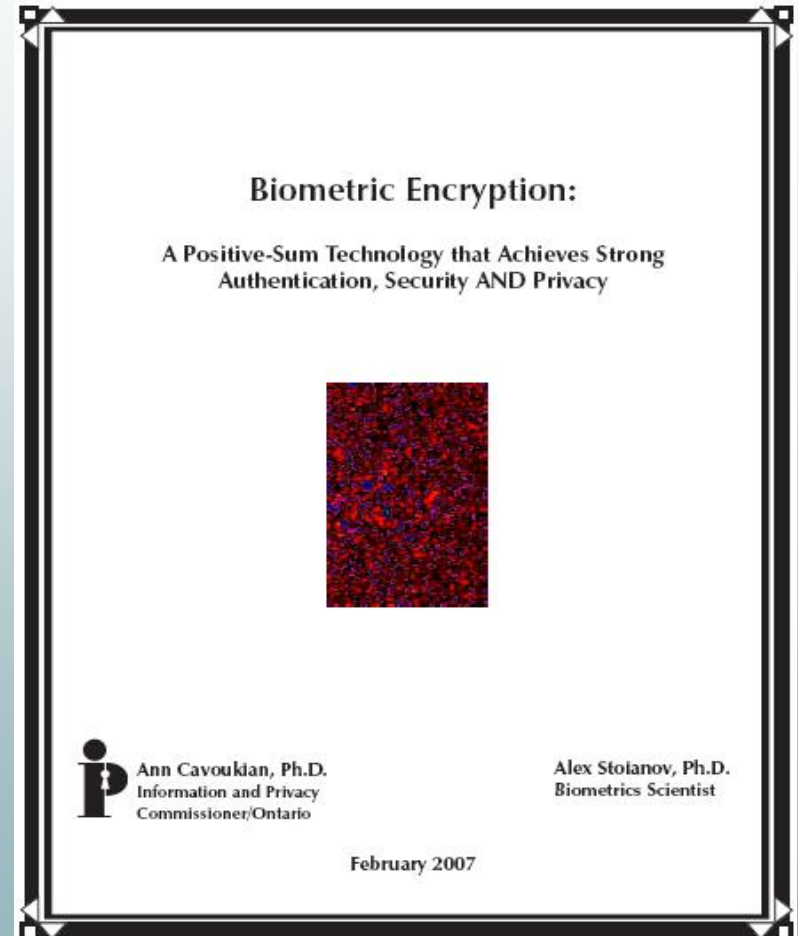
BE Embodies core Privacy by Design principles:

1. **Data minimization**: no retention of biometric images or templates, minimizing potential for unauthorized secondary uses, loss, or misuse
2. **Maximum individual control**: Individuals may restrict the use of their biometric data to the purpose intended, thereby avoiding the possibility of secondary uses (function creep)
3. **Improved security**: authentication, communication and data security are all enhanced



Our 2007 paper identified next steps to Prototyping BE:

- Select a proper biometric
- Improve image acquisition process
- Make BE Resilient Against Attacks
- Improve Algorithm Accuracy & Security
- Exploit Multimodal Approaches
- Develop BE Applications





From Dream to Reality ... Biometric Encryption: A step forward for privacy protection

- BE was invented in Toronto in mid-90's (Mytec Technologies Inc.) but was much ahead of time back then, when the whole biometric industry was still in infancy
- Since mid-2000's, there has been renewed interest in BE around the world, which especially intensified after the publication of our 2007 BE paper
- Now BE is a hot topic at all biometric conferences, with the exponential growth of the number of publications -- the IPC office alone received dozens of technical BE papers for peer review last year

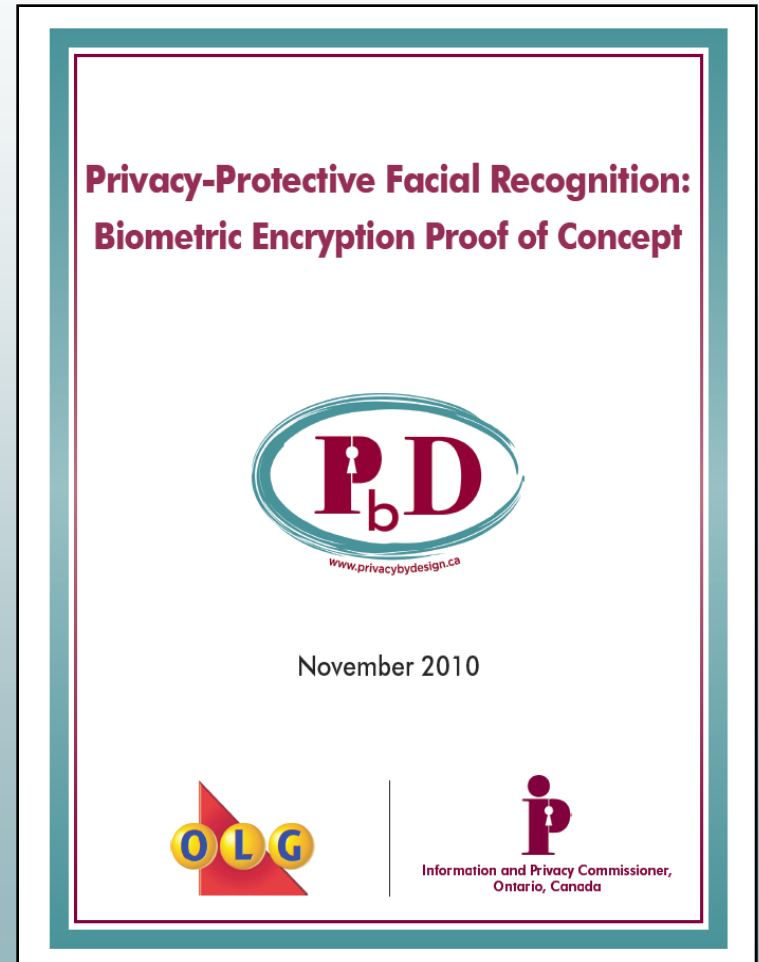


From Dream to Reality ... Biometric Encryption: A step forward for privacy protection

*OLG's winning biometric encryption
strategy ...*

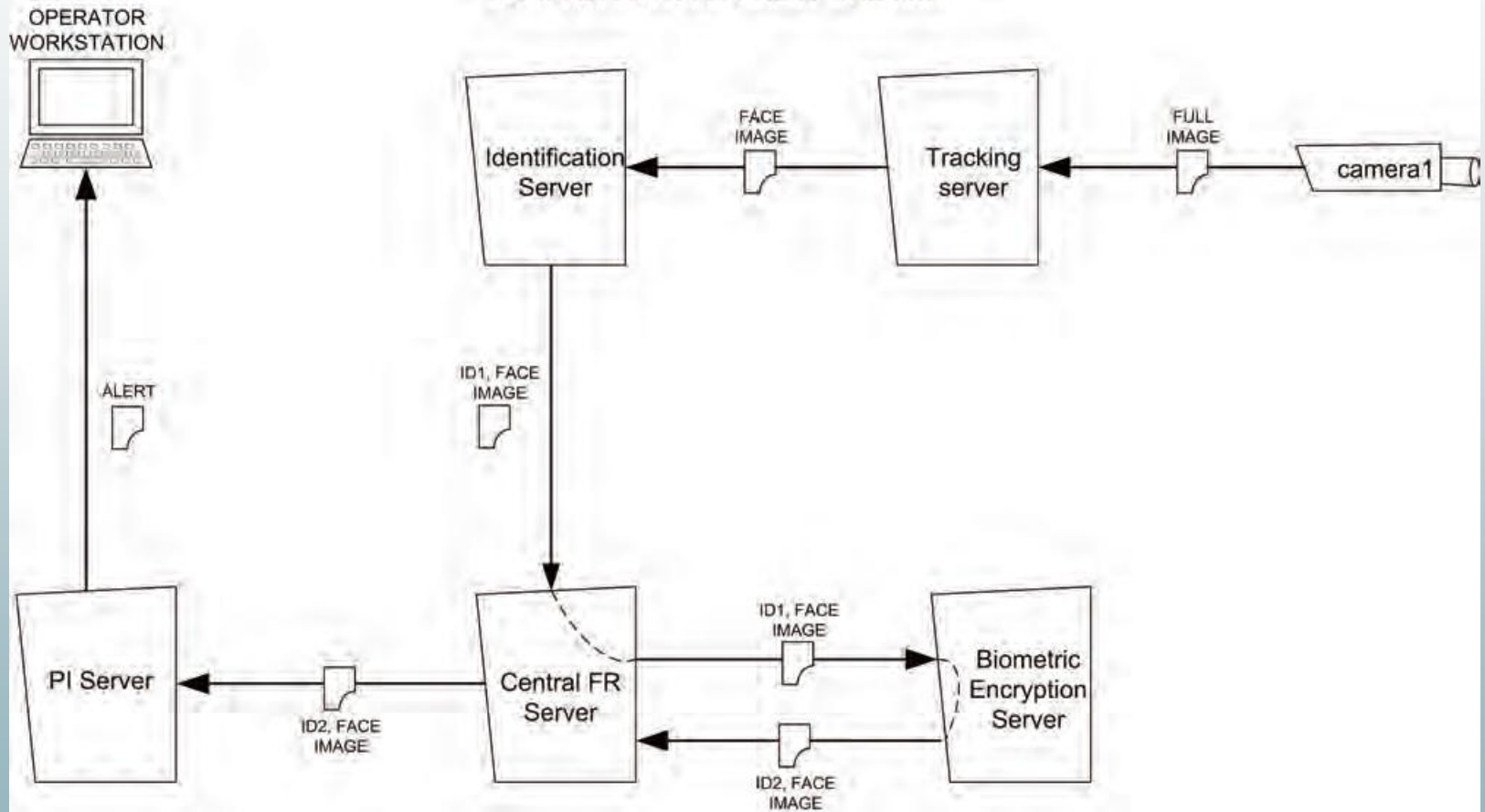
*"This biometric encryption-based
technology will offer dramatically
improved privacy protection over simple
facial recognition, without compromising
any functionality, security or
performance — the hallmarks of a
privacy by design application,"*

— Commissioner Cavoukian,





FR SYSTEM OVERVIEW SKETCH





**From Dream to Reality ...
Biometric Encryption: A step
forward for privacy protection**

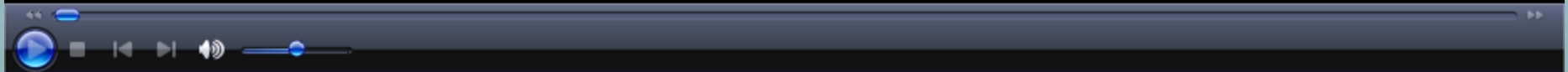
***“First they ignore you, then they laugh at
you, then they fight you, then you win.”***

Mahatma Gandhi, 1869 - 1948



A message on Privacy by Design

**Ann Cavoukian, PhD
Ontario's Information and Privacy Commissioner**





Privacy by Design in 2010: Gathering Momentum

- **May** – As part of the European Commission's new European Digital Agenda, **Peter Hustinx**, the European Data Protection Supervisor, recommended *Privacy by Design* be included as a binding principle into data protection legal framework;

www.edps.europa.eu/EDPSWEB/webdav/site/mySite/shared/Documents/Consultation/Opinions/2010/10-03-19_Trust_Information_Society_EN.pdf

- **October** – Regulators from around the world gathered at the annual assembly of **International Data Protection and Privacy Commissioners** in Jerusalem, Israel, and unanimously passed a landmark resolution recognizing *Privacy by Design* as an essential component of fundamental privacy protection;

www.privacylaws.com/templates/EnewsPage.aspx?id=1663

- **December** – The **U.S. Federal Trade Commission** released a major report in which they recommended that companies should adopt a *Privacy by Design* approach by building privacy protections into their everyday business practices.

www.privacybydesign.ca/media-centre/in-the-news/



Privacy by Design in 2011 ... We're Just Getting Started

- **January** – The **Future of Privacy Forum** included ***Privacy by Design*** as being “In” – *Annual List of Privacy In and Outs* – *PbD* one of the new top ***positive*** trends of 2011.

www.futureofprivacy.org/2011/01/03/fpfs-first-annual-list-of-privacy-ins-and-outs/

- **January** – World-renown cyberspace guru, **Don Tapscott**, wrote an op-ed in the *Globe and Mail* stating that, “*Every business needs to design privacy principles and practices into their operations ... Cavoukian’s Privacy by Design explains how to build privacy protections into everyday business practices.*”

www.theglobeandmail.com/report-on-business/commentary/don-tapscott/social-medias-unexpected-threat/article1854656/



“Your identity is your most valuable possession. Protect it. And if anything goes wrong, use your powers.”

**Helen (aka Elastigirl)
The Incredibles, 2004**





What is at stake?

Citizen/consumer *trust* of biometric systems and the organizations that collect biometric data

*Privacy is **good** for business*



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