Kennesaw State University

Center for Election Systems

Testing Legacy and Emerging Election Technologies: A Unified Model of Election and Voting Systems

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Emerging Challenge

In the future, we may not be able to separate the consequence of poorly performing election systems from well performing voting systems.

Systems

- A system is a collection of components (including subsystems) that transform inputs into outputs.
- Systems utilize feedback loops to monitor states and adjust performance
- Systems maintain interfaces with other systems

Acceptance and Use of Technology

- Four key aspects predict adoption and usage of technologies:
  - Performance expectancy
  - Effort expectancy
  - Social influence
  - Facilitating conditions
- Mediators include:
  - Gender, age, experience, and voluntariness

***Unified Theory of Acceptance and Use of Technology* - Venkatesh**

eGovernment Systems

‘eGovernment' - the utilization of IT, ICTs, and other web-based telecommunication technologies to improve and/or enhance the efficiency and effectiveness of service delivery in the public sector.

(Jeong, 2007)

eGovernment and eGovernance

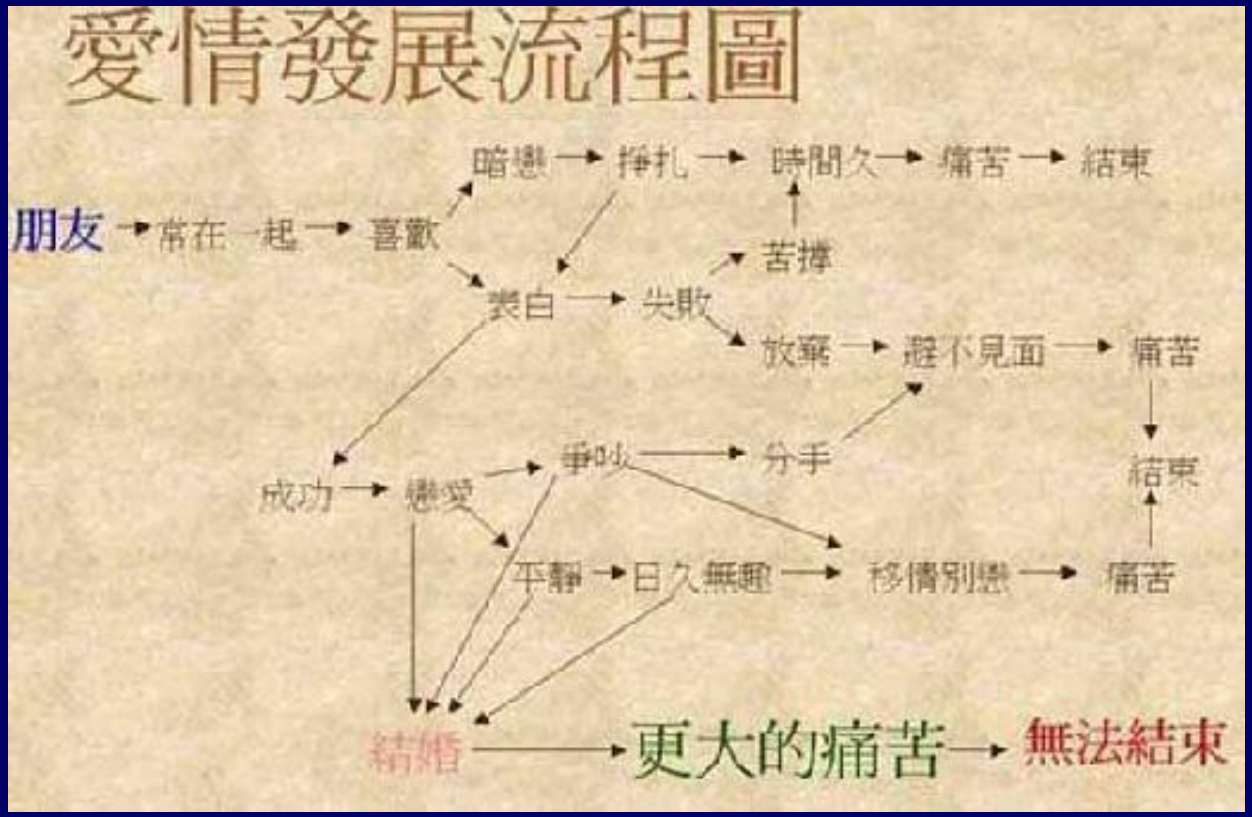
- **Focus:**
  - **The use of Information and communication technologies, including the Internet, as a tool to achieve better government.**
  - **The use of information and communication technologies in all facets of the operations of a government organization.**
  - **The continuous optimization of service delivery, constituency participation and governance by transforming internal and external relationships through technology, the Internet and new media. ***
- eGovernance is the use of ICTs to achieve better governance – including elections

** Koh*

eGovernment Examples

- Campground Reservations
- Citizen Alert System
- Dog Licenses
- Driver's License Renewal
- Find Elected Officials
- Hunting and Fishing Licenses
- Local Government Information
- Sex Offender Registry Search
- Voter Information Look up
- Services payment
- Mapping and GIS
- Water Test Kit Ordering
- WIC Services Eligibility Checker
- Business/Professional Services
- Professional License Renewals
- Public Criminal Record Search
- Title and Registration Records Search
- Aircraft Registration renewal
- UOCAVA Ballot Request
- Fine payments
- Judicial Courts Mediator Search

Deployment Plan



Uniform Voting System

- Uniformity of voting systems is multi-dimensional. Within the jurisdiction there may be uniformity in
  - Technologies
  - Vendor (single-vendor)
  - Procedures
  - Administrative organization

- Uniformity enhances standards; standards are the metrics of quality enhancement

Uniform Voting System

- A voting system that consists of a defined set of vote-capture and vote-tabulation devices, consistent procedures applied across all jurisdictions, defined roles for participants in the administration of elections and standard and consistent formats for election data and the management of that data
- Uniformity is already imposed by statute or rule on many aspects of voting and election systems
- Uniformity is a matter of degree

Uniform Voting System

- There are no single-vendor systems
- Every voting system is a collection of proprietary and integrated sub systems which have multiple vendors (consider the supply chain for consumables)
- At best, a “single vendor” is an integrator
- At worst, the vendor is a portal to the jurisdiction’s voting and election systems

Uniform or Unified?

Are jurisdictions moving toward uniformity or unification of election systems?

Emerging Systems

Voter Registration Systems

- Online VR Systems
- Online VR Application Systems
- VR Reporting Systems

Emerging Systems

Election Reporting Systems

- Statewide rollup
- County/Township/ Precinct level reporting
- Post election analysis
- Data harvesting potential
- Integration with GIS

Emerging Systems

- Vote-by-mail
- UOCAVA Ballot Delivery Systems
- Internet Voting
- Social Media

Distributed Voting Technologies

Emerging Systems

- Ballot on Demand
- Electronic Pollbooks
- Voter ID initiatives
- Accessibility Enhancements
- Security Enhancements

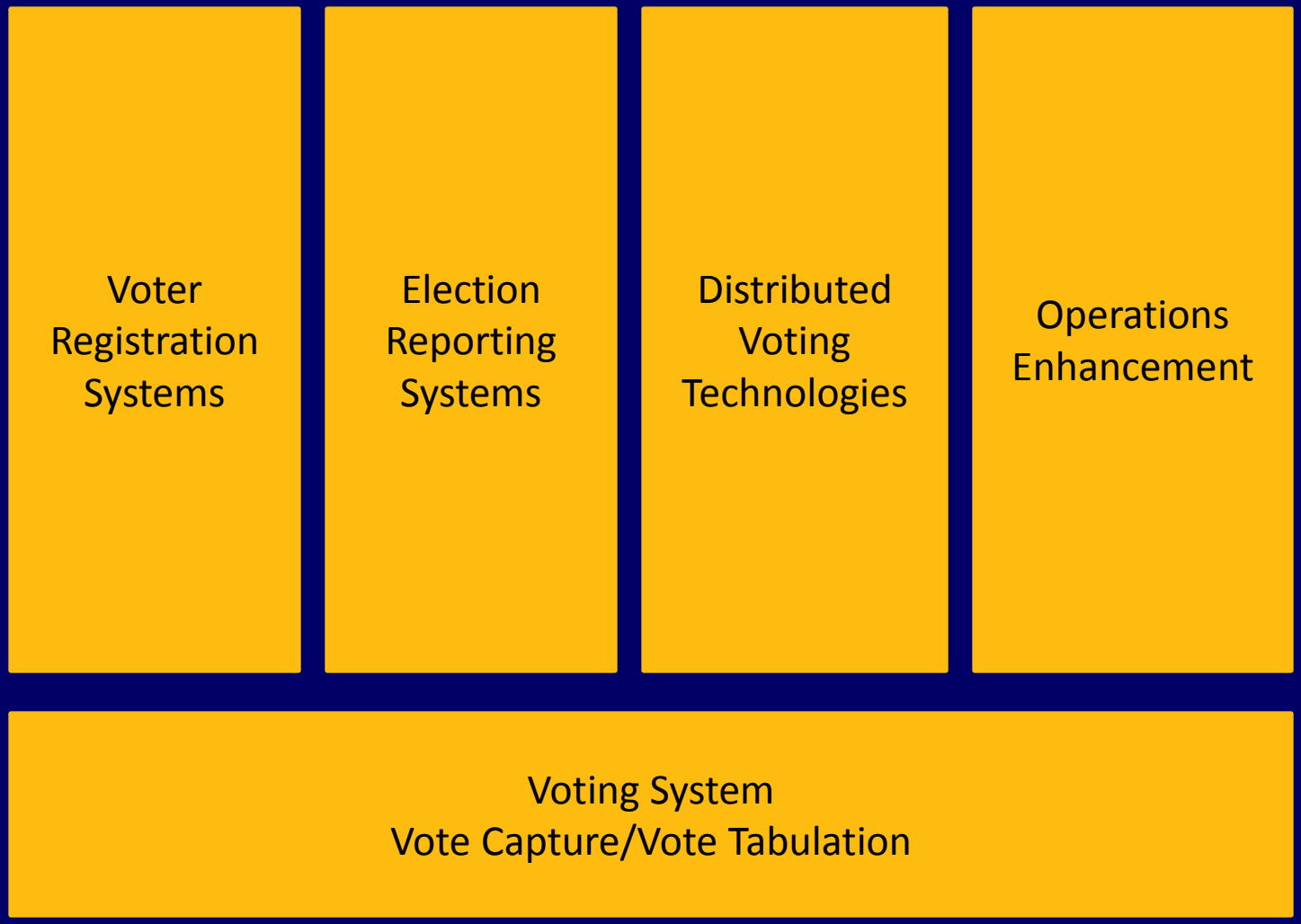
Operations Enhancement

Mature Systems

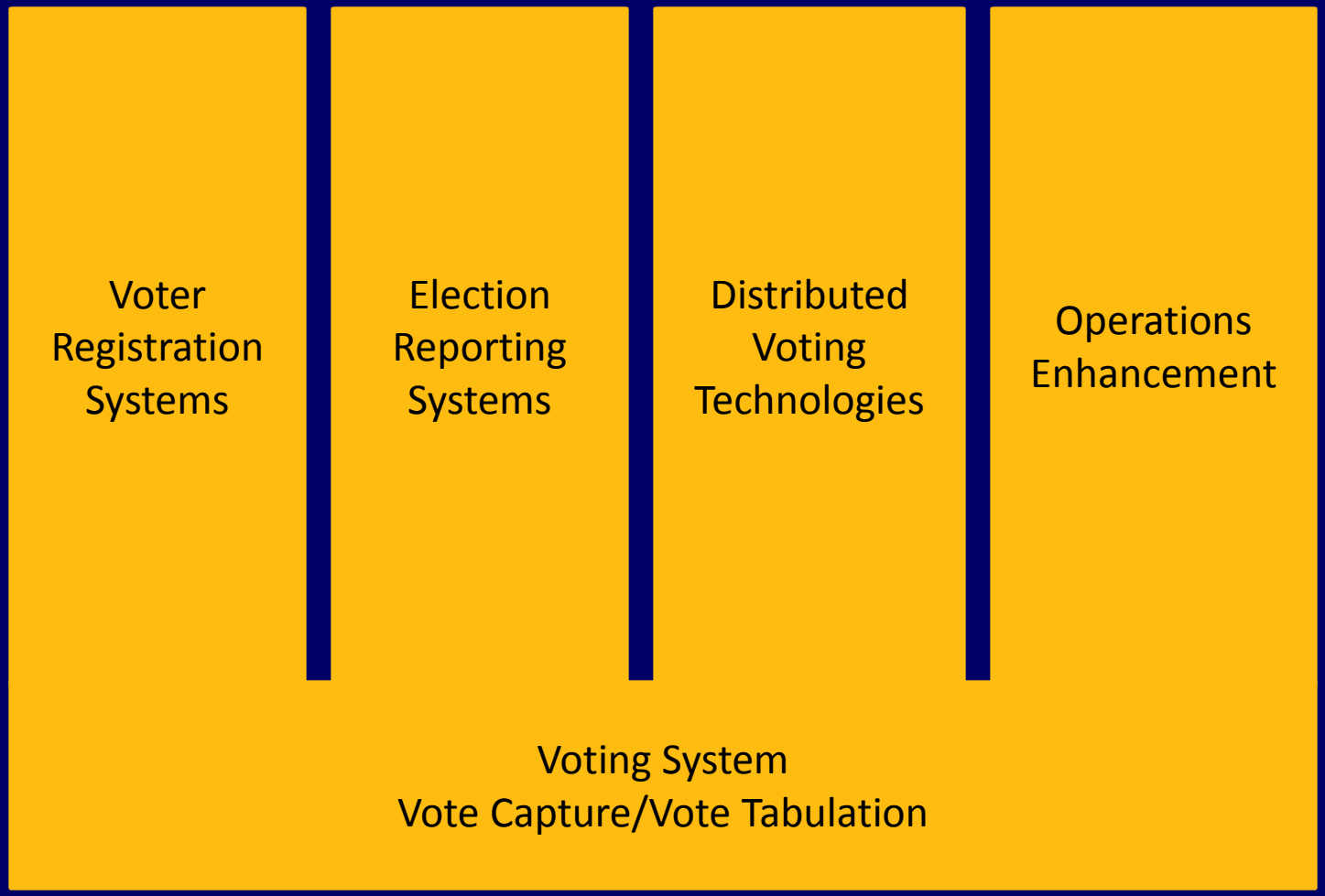
- VVSG standard exists
- Testing protocols are established and vetted
- Local focus with some State level control
- Legacy issues
- Oldest technologies; mature market

Voting System
Vote Capture/Vote Tabulation

System Convergence



Unified Election System



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Implications for testing

Emerging election systems provide inputs to, and utilize outputs of the voting system

The performance of these systems impact the operational accuracy and reliability of the voting system – and vice versa

Our testing strategies lack symmetry – we may be over-testing voting systems and under-testing election systems

Challenges for Testing

- Election systems lack standards for conformance testing. Testing may be more qualitative than quantitative
- Systems are frequently licensed, not sold to jurisdictions. Vendor involved in testing, deployment and use.
- Systems are not mature – frequent upgrades/updates.
- Implications of use (and misuse) not well understood by user community or public
- Functional testing done by vendor

Product Review & Integrated Testing

- As election systems merge, the relationship between the voting system and deployed election systems must be understood, documented and evaluated
- Dependencies should be included into voting system testing and into the testing of the election system
- In addition to functional tests – a product review

Product Review

1. System architecture – permits understanding of the scope of the system and its interface with other election systems and the voting system. Dependencies should be annotated.

2. Security architecture - A sufficiently detailed description of the methods used to secure data and access to the system.

3. Testing protocols - This should include methods used to test the system, including any test reports, as well as the overall QA system used to develop and maintain the system.

4. Business model and business continuity plan - The structure of the company, its principals, its support strategy, and assurances for continued support of the system, especially as it relates to key personnel.

5. Supply chain - A list of third-party providers of components used in the system.

Product Review

6. Revision control strategy - Detailed description of the process by which subsequent versions of the system will be developed, tested, and deployed.

7. Customer list - Does not need to be complete, but should include a sample of customers who currently use the product.

8. End user documentation - Instructions and manuals as provided to end users.

9. Server IP address for port scans and security test of the server. Tests will be coordinated so that service is not disrupted.

10. Training curriculum and materials.

11. Sample contracts and service level agreements.

Product Review

The outcomes of the product review:

- System is in-scope for inclusion with the voting system and initiate state testing
- System is out of scope, but functionally sufficient. Monitor deployment, track anomalies, continue to collect operational data
- System is out of scope but fails to meet functional requirements

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