The Rubik’s Cube* of Opportunity:

Addressing Cross-Functional Opportunities in a Holistic Fashion

Tim Platt
Vice President, Information Systems / Information Security
Toyota Motor Engineering & Manufacturing North America, Inc.

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Introduction: Tim Platt

• Began Toyota career in 1988 at the opening of the Toyota Motor Manufacturing Kentucky facility.

• Began management assignments in 1996 with newly-established manufacturing headquarters.

• Served as executive at Toyota’s European engineering, manufacturing and sales headquarters in Belgium from 2004-2007.

• Was appointed in 2009 to lead the Information Systems Division for Toyota Motor Engineering & Manufacturing North America, Inc.

• Was also appointed to a dual assignment leading the Information Security Office and its cross-functional group.

• Was named Vice President in January of 2011.
Background: Toyota Eng & Mfg

TEMA Engineering and Manufacturing Operations In North America

- **R&D Headquarters**
  - York, Michigan
  - Timmins, ON, Canada
  - Wittman, AZ
  - Gardena & Torrance, CA
  - Aiken, SC
  - Ann Arbor, MI
  - TTC Headquarters

- **MFG Locations**
  - Plymouth & Livonia, MI
  - TTC Headquarters

- **HQ Locations**
  - York, MI
  - TTC Headquarters

- **Engineering Locations**
  - Fairbanks, AK (Cold Weather Testing)
  - San Francisco, CA (Tesla)
  - Sacramento, CA (Fuel Cell Research)
  - Wittman, AZ (Vehicle Evaluation, Hot weather Testing, Product Media Events)
  - MFG HQ, Erlanger, KY
  - Aiken, SC (Hydrogen Research partner w/ Georgia Tech)
  - Ann Arbor, MI (Battery Lab, Toyota Center for Quality Excellence, Toyota Research Institute, Powertrain Development, Performance & Evaluation, Materials Engineering, Unit Development & Regulation)
  - TTC Headquarters (Engineering Design, Safety Test, Electrical Systems)

- **Manufacturing Locations**
  - San Francisco, CA
  - Sacramento, CA
  - Wittman, AZ
  - Gardena & Torrance, CA
  - Aiken, SC
  - Ann Arbor, MI

- **Information Systems** located at more than 5 Engineering locations & 12 Manufacturing locations
Background: Toyota Eng & Mfg

- 9 vehicles produced in the United States
Background: Toyota Eng & Mfg

- 2 USA models also produced in Canada and Mexico
- 3 additional models produced there
5 departments
14 sections

~150 team members
~280 variable work force
plus some managed services

Background: IT Organization

Tim Platt
Vice President

IT Management
Business Systems Innovation (Applications)
Information Technology (Pre-Production Applications and Infrastructure)
Shared Services & Relationship Management (Sites and Operations)

Information Security Office
Risk Mgmt
Enterprise Architects
Planning & Mgmt Office
Supply Chain & Financial Business
Production & Quality Business
Team Member & Supplier Business
Pre-Production Business
Network & Comms.
Clients
Servers

Site Services North
Site Services West
Site Services South
Central Ops & Service Desk

Cross-Functional Members
Background: IT Organization

**DIVISIONAL CHAMPIONS**

**Diversity and Human Resource Programs**
- Diversity Program Lead
- Human Resource Program Lead

**Other Key Programs**
- Service Management
- Quality
- Resource Management
- ROI
- Cost Savings
- Productivity / Rework
- Partner Satisfaction
- Compliance
- Business Comm & Engagement
- Technology Antenna

**Other Key Programs**
- Well-Being
  - Morale
  - Team Bldg
  - Recognition
  - Wellness
  - Safety

**Other Key Programs**
- Engagement
- Hiring
- Development
- Review

**Other Key Programs**
- Recruitment
- Progression Opportunities
- Capability
- Succession

**Other Key Programs**
- Diversity and Human Resource Programs
Many IT organizations operate as service providers, addressing business objectives only when formal requests are made & clear business leadership exists.

Initiating processes are defined to simply prioritize requests to IT.
Opportunities not contained within one business organization’s scope are not addressed.

Opportunities may be lost in the prioritization process due to lack of consensus or failure to consider corporate value.

Requests are made only for pre-defined capabilities that IT is known to have.

Others either fall to the side or are addressed through risky methods.
The Opportunity

High business-value opportunities of a cross-functional nature are often left unaddressed.

• To address, the role of IT must change with new skills, processes and tools.
• These need to be integrated into the existing environment.
Our Journey at Toyota

• The Journey began by evaluating our role and opportunities to contribute greater value to the business.

• Six cross-functional areas of opportunity were identified.

• But we needed to approach them in a holistic fashion, coordinating between the six initiatives.

• In fact, all opportunities needed to be addressed simultaneously for success.

• The challenge became known as The Rubik’s Cube of Opportunity*.

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Rubik’s Cube of Opportunity

- Business Leadership
- Scalable Development
- Mfg./Plant Operations and Support
- Plant Visualization
- Business Intelligence
- Business Architecture

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# Rubik’s Cube of Opportunity

<table>
<thead>
<tr>
<th>Side</th>
<th>Name</th>
<th>Description</th>
<th>Condition</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Business Leadership</td>
<td>- Many IT beneficiaries were not properly represented.</td>
<td>Poor</td>
<td>Establish capability within IS. Offer the education to the business as well.</td>
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### Requirements

<table>
<thead>
<tr>
<th>Skills</th>
<th>Processes</th>
<th>Tools</th>
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<tbody>
<tr>
<td>• Consensus building</td>
<td>• Functional objectives</td>
<td>• Business Leadership Academy</td>
</tr>
<tr>
<td>• Process Reform</td>
<td>• Skills Assessment</td>
<td></td>
</tr>
<tr>
<td>• Organizational Dynamics</td>
<td></td>
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## Rubik’s Cube of Opportunity

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<tr>
<td>2</td>
<td>Business Architecture</td>
<td>IT’s unique position to see all business processes from vehicle concept to warranty was not being capitalized upon, leading to lost value</td>
<td>Fair*</td>
<td>Develop broad view of all processes &amp; systems. Identify gaps, inefficiencies or ineffective solutions. * Varied greatly by business unit or shop</td>
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<tr>
<td>• Process analysis</td>
<td>• Unified Demand Management Systems</td>
<td>• System Map tied to ITIL Service Catalog</td>
</tr>
<tr>
<td>• Value identification</td>
<td>• Inventory of IT and Non-IT Apps</td>
<td></td>
</tr>
<tr>
<td>• Business Leadership</td>
<td></td>
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<tr>
<td>3</td>
<td><strong>Business Intelligence</strong></td>
<td>Data, information, and knowledge was locked in transactional systems. Business had grown accustomed to manual process using Excel and Access solutions.</td>
<td>Poor</td>
<td>Provide capability through delivery of one tool, process and source of info for adhoc / gold-standard reporting.</td>
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![Diagram](Rubik's Cube)

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<tr>
<td>• Enterprise Data modeling</td>
<td>• Prioritization, delivery &amp; support processes</td>
<td>• BI strategy &amp; environment</td>
</tr>
<tr>
<td>• Data movement</td>
<td></td>
<td>• New Team</td>
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![Diagram](Rubik's Cube)
Rubik’s Cube of Opportunity

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<td>4</td>
<td>Plant Visualization</td>
<td>Large volumes of production information locked away in plant equipment and robotics systems. Lost opportunity to utilize for better decision making.</td>
<td>Fair*</td>
<td>Provide one tool &amp; team capable of delivering solutions. Partner with Prod Eng. &amp; plant shops.</td>
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* Varied greatly by business unit or shop

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<tr>
<td>• PLC / data controller skills.</td>
<td>• Prioritization, delivery &amp; support processes.</td>
<td>• Plant Visualization tool</td>
</tr>
<tr>
<td>• Partnering skills with Prod Eng. &amp; Shop members.</td>
<td></td>
<td>• Strategic Partner</td>
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Business Leadership
Mfg./Plant Operations and Support
Plant Visualization
Business Intelligence
Scalable Development
Business Architecture
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<td>5</td>
<td>Manufacturing &amp; Plant Operations Support</td>
<td>IT support of plant systems limited to just a few systems. Many shop floor systems at risk. Little sharing of valuable solutions between plants.</td>
<td>Poor</td>
<td>Offer greater flexibility in support. Build partnerships. Inventory systems and mitigate risks.</td>
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<tr>
<td>• Manufacturing process skills</td>
<td>• System support model</td>
<td>• New IT environment</td>
</tr>
<tr>
<td>• Small solution development</td>
<td>• System migration model</td>
<td>• Sharing mechanism</td>
</tr>
<tr>
<td></td>
<td>• Site Staffing</td>
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<td>6</td>
<td>Scalable Development</td>
<td>While IT was delivering large complex programs well, was not optimized to deliver small solutions quickly.</td>
<td>Poor</td>
<td>Scale down development processes. Establish pre-installed environment. Prepare Team.</td>
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<td>• Agile-like development capability</td>
<td>• Scaled Down development process</td>
<td>• Virtualized environment</td>
</tr>
<tr>
<td>• External partner mgmt. incl. offsite</td>
<td>• Offsite development</td>
<td>• Deployment model</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 3rd parties</td>
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Rubik’s Cube of Opportunity

- Business Leadership
- Mfg./Plant Operations and Support
- Plant Visualization
- Business Intelligence
- Scalable Development
- Business Architecture
Selection of Opportunities

- Examine Key Indicators of Potential Contribution

  - CORE Business Processes
  - Industry Best Practices not used
  - Industry Capability not used
  - IT Industry Capability not used
  - ID Potential Contribution
  - ID Potential Contribution
  - ID Potential Contribution
  - ID Potential Contribution

- Prioritize based on Benefit

  - Key Business Objectives by Top Mgmt
Inter-Relationships

• View into the holistic nature

- Business Leadership: Fills Organizational Gaps
- Business Architecture: Provides Proactive Insight
- Mfg / Plant Operations & Support: Develops Partnering Relationship, Demonstrates Capability to Move Quickly, Core Business
- Scalable Development: Provides 30% of needs

Skills, Processes, Tools

Without holistic view, puzzle is not solved
## Current State of the Journey

*Significant progress has been made, but the journey continues...*

### Completed

- Piloting Academy courses
- Built trust relationships
- Engaging as a partner
- System map process done
- Began demand mgmt. process
- Established functional objs.
- Established strategy & team
- Selected technology & deployed
- Cataloged data & began delivery
- Established team & strategy
- Selected vendor and product set
- Deployed initial solutions
- Completed inventory of all systems
- Developed mitigation process
- Created framework to support migrations
- Developed most of necessary development framework
- Established team of 3 vendors
- Began delivering against $8 M in identified benefit

### Remaining

- Complete pilot of Academy
- Develop capstone project
- Enhance offering and coverage
- Expand coverage
- Complete demand mgmt.
- Establish global framework
- Complete delivery of first solutions and reflect
- Expand capacity
- Confirm roadmap
- Deliver more solutions
- Develop capacity
- Migrate systems
- Enhance ability

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**Business Leadership**

**Business Architecture**

**Business Intelligence**

**Plant Visualization**

**Mfg & Plant Support**

**Scalable Development**
Applicability

- Each organization likely has the equivalent of its own Rubik’s Cube

- Our particular journey is unique though:
  - Toyota Production System principles
  - History of Past Failures
  - Consolidated nature of IT organization while Plants remain individualized
  - Distribution of responsibilities between regional functions, shop task forces and local groups
  - Readiness of the IT Organization
Applicability

However, all programs will likely include:

• A reconsideration of IT’s role and a study of the current shortcomings
• Establishing a strategic program that promotes individual ownership while maintaining bonds to inter-related activities
• New skills, processes and tools
The Reward

• $8M expected benefit already identified on the initial small, quick Scalable Development solutions for Manufacturing.
• The financial return with the larger scale capabilities of Business Intelligence and Plant Visualization, when confirmed, will dwarf this.
• And its not just financial, the teams have a new energy and excitement around their role.
• They feel a new respect for their contribution.
The Rubik’s Cube of Opportunity:

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