Practical Approach to Implementing Business Intelligence in Higher Education

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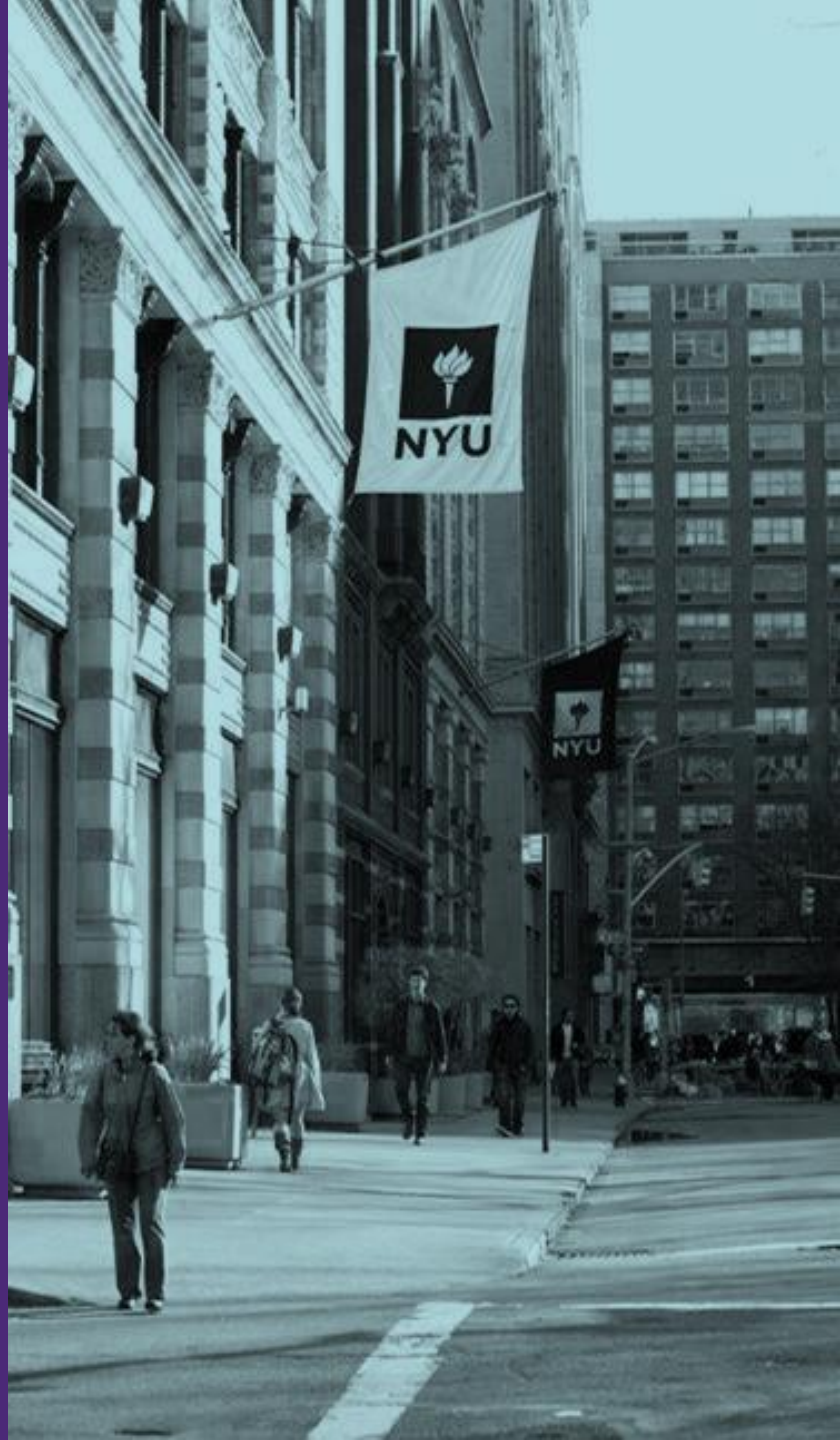
NEW YORK UNIVERSITY




Higher
EDUCATION
FOR ALL


NYU

HIGHER EDUCATION – ARE WE DIFFERENT FROM OTHER SECTORS?

In Existence for 150 years or more & Expecting to stay for the next 100 years or more
- Not Expecting to be 'out of business'
- High organizational boundaries with heavy reliance on personal relationship

Breath of Operations
- From Teaching, Research, and Auxiliaries to Constructions, Retail, Alumni Relations, Health, Public Safety, Hospitals, Libraries, Real Estate, and much much more
- Highly Political and Complex Organizational structure with often conflicting priorities

Not driven by short term objectives:
- Our measurements and assessments are not focused inward
- Measuring and assessments are often perceived as a threat

Analytical culture:
- Who are the Analysts? What are the processes?
- Informational silos are relatively high

Low Turnover:
- Years of Service - not uncommon to be between 10 – 20 years and more
- Loyalty: to University AND the 'old ways of operations'

Academic Freedom and Tenure often translates into:
- Central Administration vs. Individual Schools vs Academic Departments vs Faculty Senate vs ……
- Collaborative Culture: Decisions are made by committees and by consensus

Change is Slow

ARE WE READY FOR CHANGE?

Increase Financial /Operational Efficiency

Expand Local & Global Impact

Establish New Funding Models

Reduce Cost

- Endangered Endowments
- Cuts in Federal & State Support
- Cost of regulatory compliance
- Demand for Greater Affordability
- Demand for Accountability

Changing Markets

- College Degree is Necessity
- Changing Student body
- Globalization
- Increased Competition

Changing Technology

- Social
- Cloud
- Interactive
- Access to Information from Everywhere, Any Time, on Spectrum of Devices
- Fast

EVIDENCE OF CHANGE

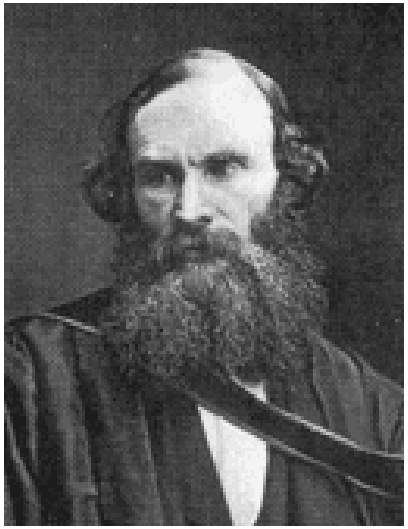
- Global Expansions beyond Study Abroad Programs
- Offering Degrees outside USA
- Startups like *UniversityNow* are creating reasonably priced online universities, and startups like *Udacity* and *Coursera* offer online-only classes
  - *Not yet clear business model: Advertising, or selling information on students to prospective employers?*
  - *Will this threaten the private mid and lower ranking tier?*
- Hybrid of in-class and online teaching delivery is a reality
- On-line delivery lowering the cost of education enabling faculty to teach more students , improve learning outcomes
- Outsourcing & Cloud Computing

Few Evidence of Change in Demand for Analytics

- University Leadership
  - Requests for 'Dashboards'
  - Formulating Academic Metrics
  - Formulating Administrative Metrics
- Educause, University Leadership Council – Publishing BI Studies
- HEDW – membership growth from 30 people in 2003 to around 2100 today
- Higher Education Job postings in BI
- BI Vendors and Consultants start focusing on Higher Ed

WHAT WE NEED TO KNOW

- Profile of Students that are most likely to succeed => Profile of applicants combined with student data
- Affordability and Financial Aid: socioeconomic profile of our student body
- Early detection of students struggling academically => Faculty early intervention; Advising
- Cost/Benefits Analysis and Assessment of Academic Programs
- Cost to attract, retain, and graduate: per student
- Supply and Demand of course offerings
- Which Alumni are likely to make large donations
- Research: Proposal success rates, growing areas, funding opportunities, Cost Sharing and Indirect Cost projections/commitments
- Cost Reduction-Financial and Operational indicators: identifying inefficiencies and duplications, non value added functions
- Faculty Productivity: Research, Publications, Teaching, Advising, Scholarly activities
- Space utilization and optimization
- Workforce Analysis
- Libraries: Subscriptions Cost/Benefits and Allocation models

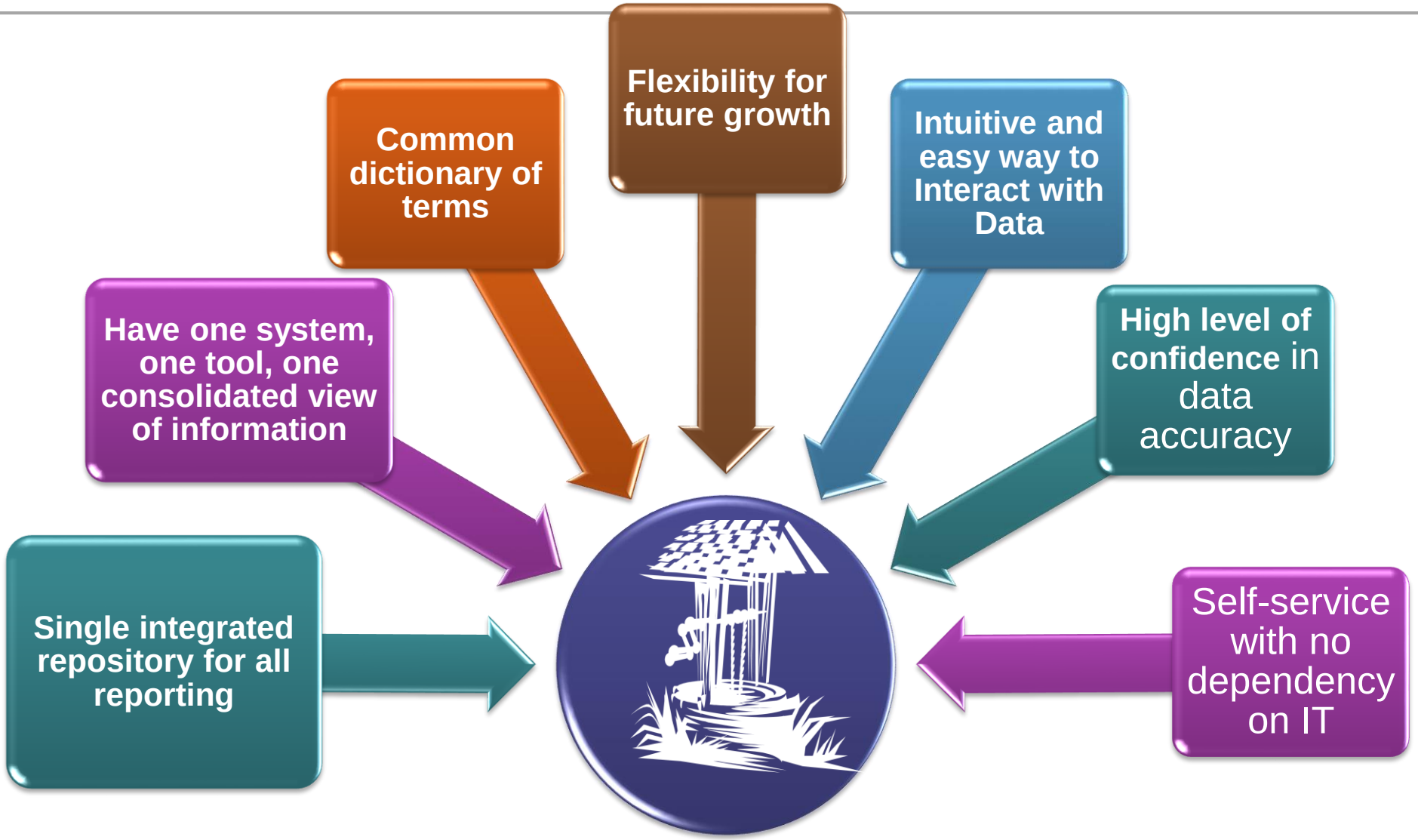


Lord Kelvin

"If you can not measure it, you can not improve it."

"Organization Maturity Model"

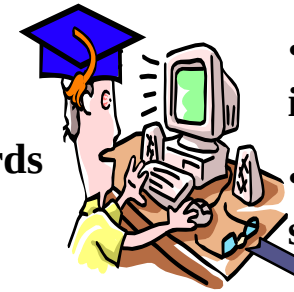
INTEGRATED INFORMATION: THE "WISHING WELL"



WHERE IS INFORMATION?

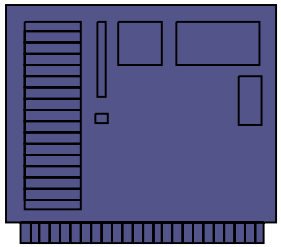
- Finance
- HR
- Payroll
- Research accounting
- Budgeting
- Purchasing

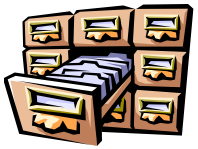
- Admissions
- Financial Aid
- Students records
- Scheduling
- Registration
- Account Receivables
- Housing

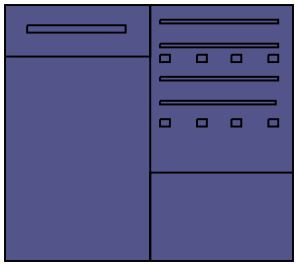


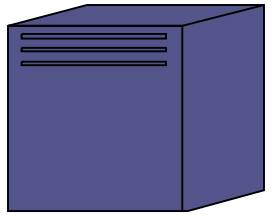
- Budgeting info.
- Individual student

Institute Advancement, Health Services, Space Management, Contract and Grants, Housing, Bookstore, Meal Services, etc.









Other

How Information Is Retrieved

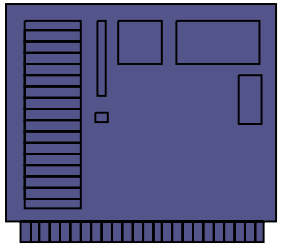
Decision makers

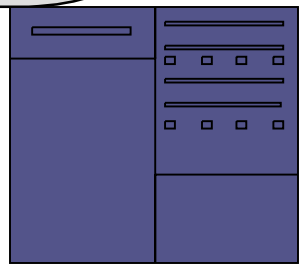
Core Administrative Offices

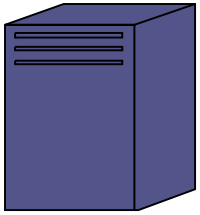
Academic Schools

select
NVL(ORGN_CODE_KEY,FTVFUND_
ORGN_CODE_DEF),

IT







FUNDAMENTAL PROBLEM

Operational systems are not designed for information retrieval and analytical processing

SOME BASIC DEFINITIONS:

Data Mart	Enterprise Data Warehouse	Business Intelligence (BI)
• *Is a **collection of Subject/Process specific data** that is pulled together primarily from operational business systems and is structured and tuned for easy access and use by information consumers and analysts, especially for the purpose of decision making. **Non integrated (Silo) Data Mart – reflects department specific view***	• *Is a collection of data that is pulled together primarily from operational business systems and is structured and tuned for easy access and use by information consumers and analysts, especially for the purpose of decision making. **Integrated and Portrays Institute wide view***	• *Consists of the processes, tools, and technologies required to turn data into information and information into knowledge and plans that drive effective business activity:* • ***- Utilization of the analytical tools in our processes*** ***- Knowledge and skills to use business analysis to identify/create knowledge*** ***- Organizational skills and motivation to develop BI program across campus***

Analytical Maturity

WHAT IS THE PROBLEM?

We are large University with independent schools, how do we satisfy everyone?

I get it but my leadership does not

How do I Explain to my Management it's NOT Just Technology?? ??

I can NEVER TRUST these Reports!!!

We are a small community college with no funding

We are IT and all people seems to want are some reports! This is not Analytics

We are a large Global University

We are IT and we are constantly putting off fires.

We invested in all this technology but I can never get the answers. Every time I need information it's impossible to find out who has it. Why do we have these problems?

We are IT and our users complaining about reports, yet they are constantly change their minds. They never can agree on what they want

Our IT does not has the knowledge and expertise in DW/BI

We are IT but we can't be responsible for the data!!! Its business problem

We are IT and we cant let our users create their own queries, they don't know what they are doing and can bring the system down!

We are IT and our Provost wants information but no one even collects this data!!!

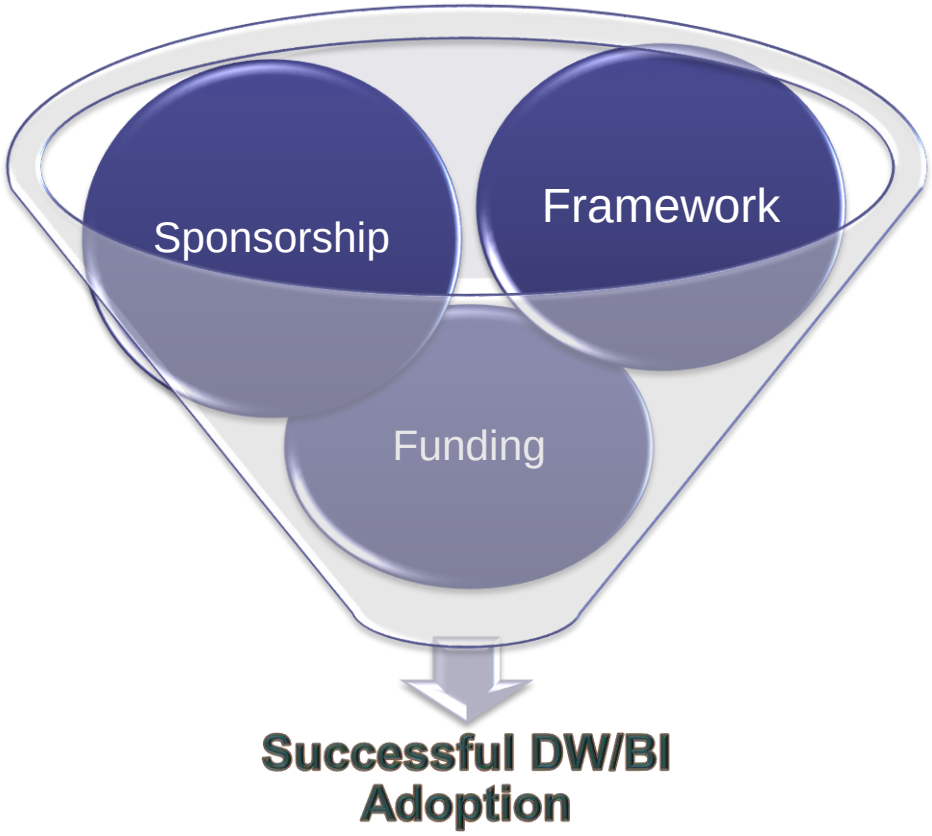
We are IT and they throw more and more projects at us. Yet we never seem to receive enough funding, resources, or time

Who is in Charge here??!! This SOoooo FRRRUSTRATING!!!!

IMPLEMENTING BUSINESS INTELLIGENCE AND DATA WAREHOUSE

Personal Journey of Practicing, Learning, Teaching, and Advising:

- ❑Rensselaer Polytechnic Institute
- ❑New York University
- ❑Advising and Consulting to Other Universities
- ❑HEDW, Educause, TDWI, NERCOM, HEUG, AIR, and etc



Defining Success - Adoption of BI by a large and diverse user community: Deans, Department Chairs, Academic Leadership, Faculty, Administrators, and Analysts

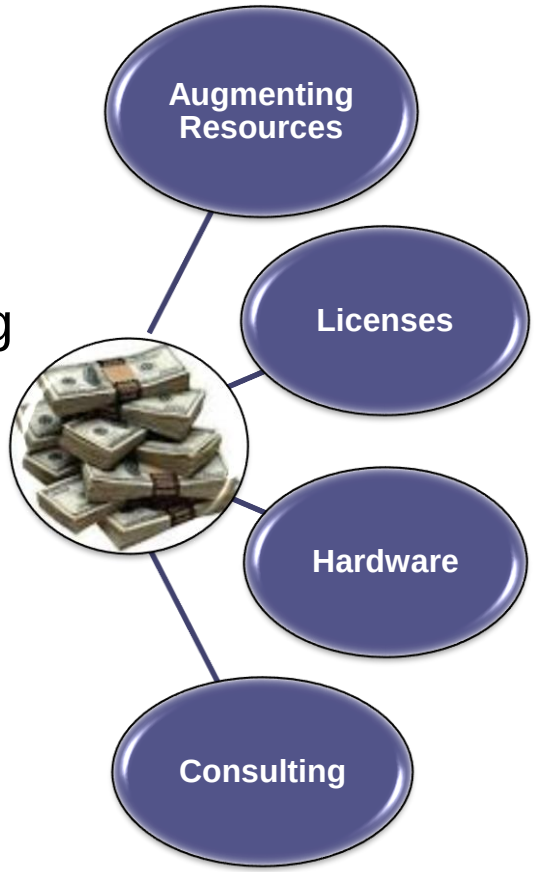
SPONSORSHIP

Executive level sponsorship is a must

- Shop for one if you don't have it: Who needs the information most?
- Demonstrate Value:
  - Prototype
  - Examples from Peer Institutions
- Gain Trust
  - Previous Success
  - Demonstrate Knowledge
  - Share Strategy
  - Share Risks and Mitigation Plans

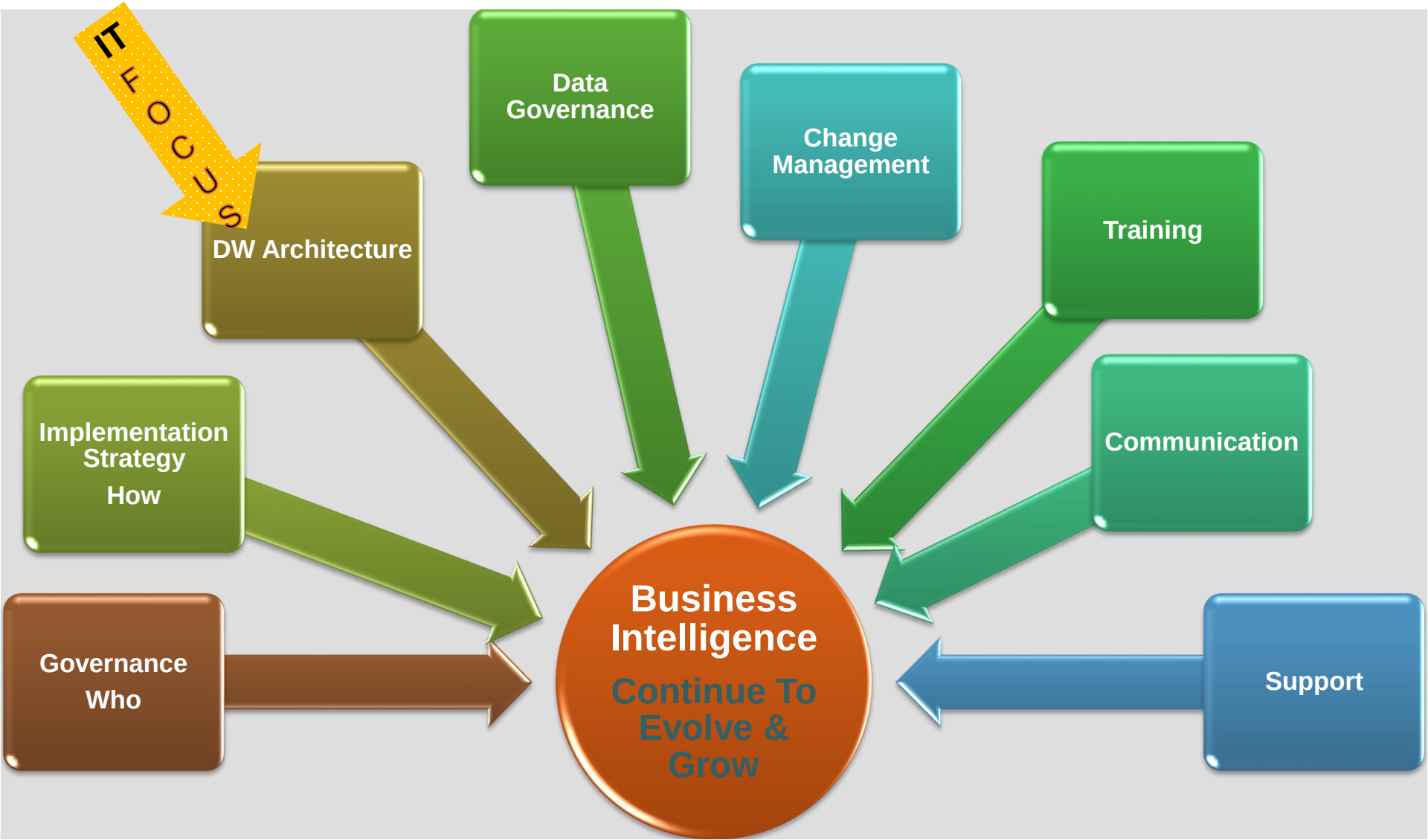
FUNDING

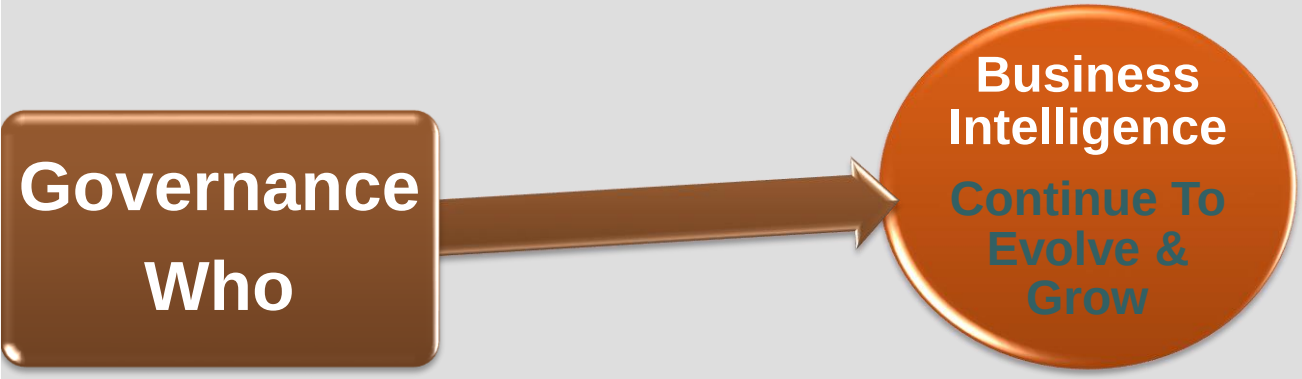
- Determines Scope
- True Indication of Commitment
- Usually Comes in Phases
- Proven Success Secures Future Funding
- Be Creative:
  - Combining funding sources
  - Reallocating Resources
  - Proof of Concept



LARGE OR SMALL IMPLEMENTATION: WE NEED A FRAMEWORK

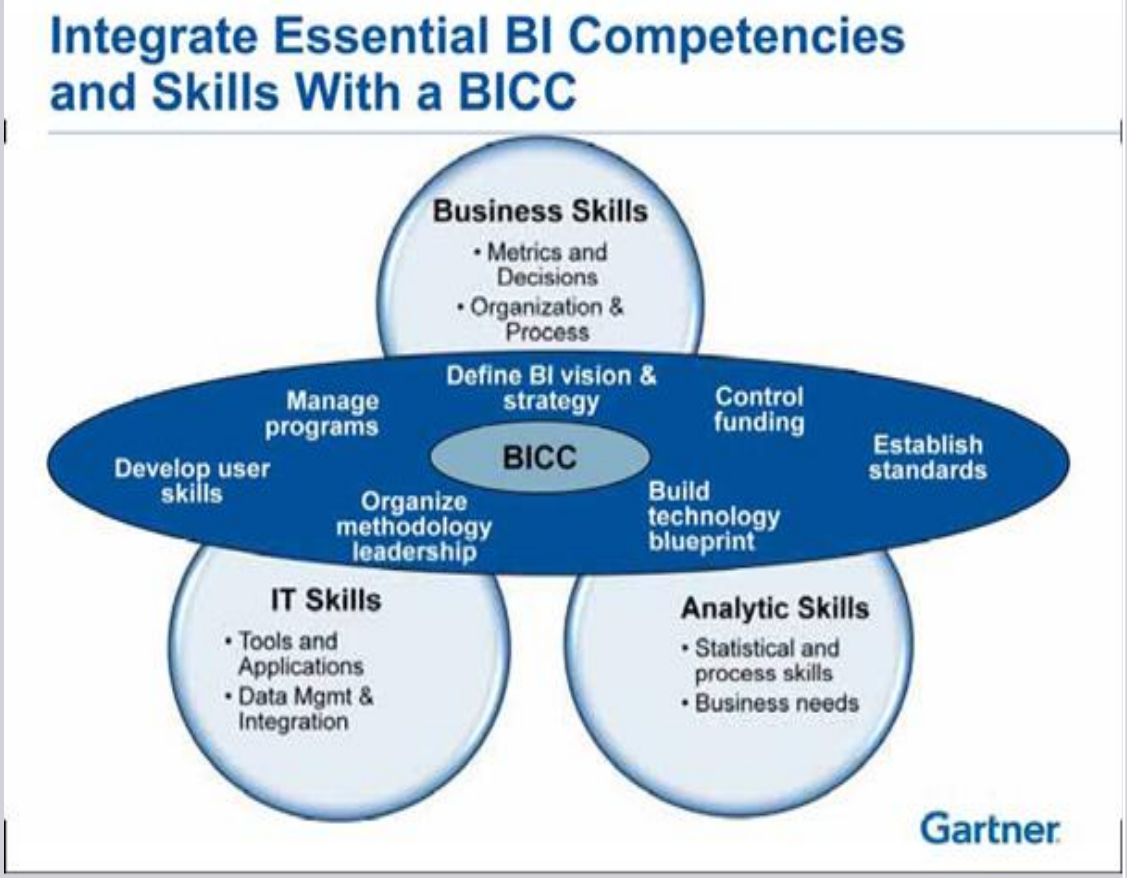
BI is a Program that evolves over period of time and is monitored and assessed




Governance
Who
Business
Intelligence
Continue To
Evolve &
Grow

WHO 'OWNS' THE BI PROGRAM - GOVERNANCE

Business Competency Center (BICC) or its various derivations – Accountable for the BI Success



- Obtain & Control funding
- Set Priorities
- Define Success Metrics and Measure results
- Leading/Managing
  - Technical implementation
  - Data management activities
  - Training
  - Communications
  - End-user support
  - Define requirements and set priorities

PRACTICAL

Leading BI/DW Program:

- Excellent Marketing, Communication, and Personal skills
- Authoritative i.e Knowledge & Experience in Building BI Programs
- Building Relationships
- Understanding Higher Education and its many different constituencies groups

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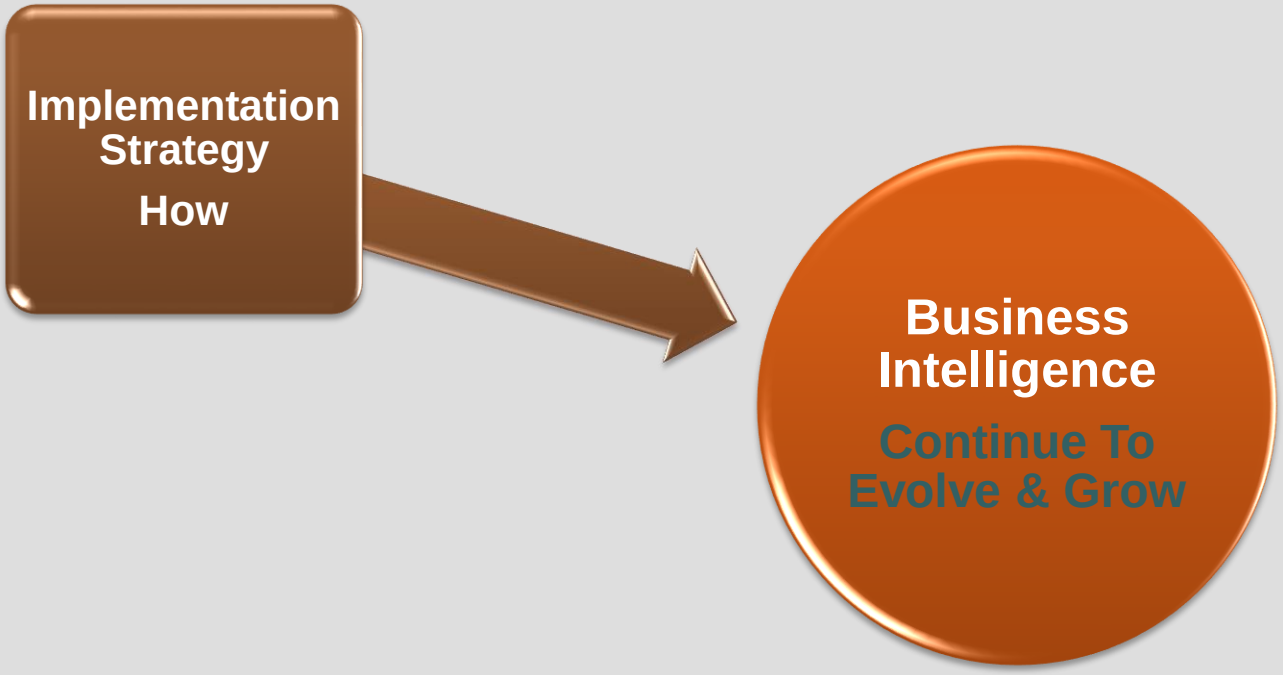

IMPLEMENTATION STRATEGY: *Plan Big Deliver Small and Fast*

Plan Big:

- Developing Roadmap & Defining Information areas: Students (Admissions, Financial Aid, Enrollment, Registration, Grades, Student financials, Graduation), Research (Proposals, Awards, Financials), Finance, Human Resources, Alumni, Giving, Endowment, Space
- Develop Strategy for:
  - Data Governance, Training, Support, Change Management, and Communications
- Managing Projects and On-Going Enhancements
- Establishing Prioritization Process
- Implementation Approach
  - Iterative / Agile
  - Integrated Data Warehouse: Kimball Bus Architecture
  - Star Schemas & Conformed Dimensions
- Defining Roles & Responsibilities:
  - Identifying Sponsors
  - User Groups & Committees
  - Roles of IT, IR, Others

IMPLEMENTATION STRATEGY: *Plan big deliver small and fast*

Deliver Small & Fast

- Defining Constituency & Segmentations
- Requirements gathering: *Focused on the business questions that need to be addressed NOT Reports*
- Defining Deliverables Based on the Segmentation:
  - Dashboards
  - Interactive Reports
  - Data Structures to support Ad-Hoc

Information Delivery Strategy

- Capturing Business Meta-Data
- Capturing Business Definitions ie Transformations
- Testing, Validations, and Certification: (What, How, When)
- Rollout (What, How, When): Training & Communications throughout

WHO NEEDS WHAT INFORMATION – OVER 1,500 USERS AND GROWING

Academic Leadership Deans/Dept Heads

- Financial Indicators:
  - ✓ Revenue & Expense Analysis
  - ✓ Tuition & Financial Aid
  - ✓ Endowment
  - ✓ Capital Projects
  - ✓ Research Financials
- Departmental Metrics:
  - ✓ Rich set of Enrollment, Teaching, & Course offering metrics
  - ✓ Faculty hiring and retention
  - ✓ Graduation rates & Time to degree
  - ✓ Research Analytics
  - ✓ Global Study
  - ✓ External Benchmarking
  - ✓ Internal Benchmarking

Administrative Leadership

- Financial Indicators
- Financial Operations
- Service Metrics
- HR Metrics & Longitudinal Analysis

Fiscal Officers

- Financial Operations
- Comparative Analysis
- Standard Interactive Reports
- HR Longitudinal Analysis
- Balance of Trade

Department Administrators

- Financial Operations
- Standard Interactive Reports
- HR Longitudinal Analysis
- Student Enrollment
- Course Offering & Teaching Load
- Balance of Trade

Managers

- Financial Operations
- Service Metrics

Principal Investigators

- Grants Management (for PI)
- Grants Dashboard Lite

Grant Administrators

- Grants Management (for Grants Admin)
- Standard Interactive Reports

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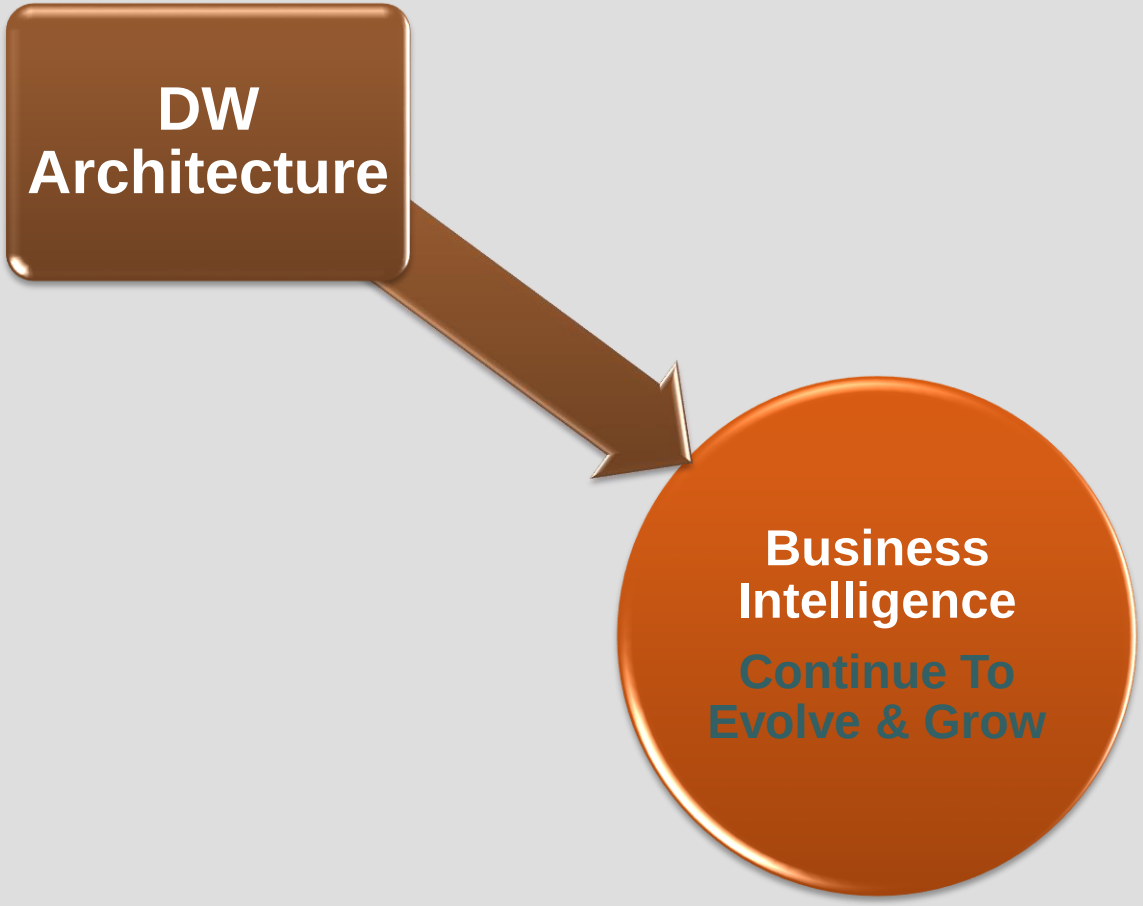


TECHNICAL ARCHITECTURE

DATA SOURCES

- operational systems
- transactional systems

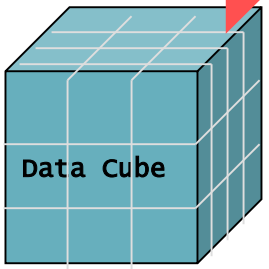
DATA ACQUISITION

- extraction
- transformation
- modeling
- loading

Integrated DATA WAREHOUSE

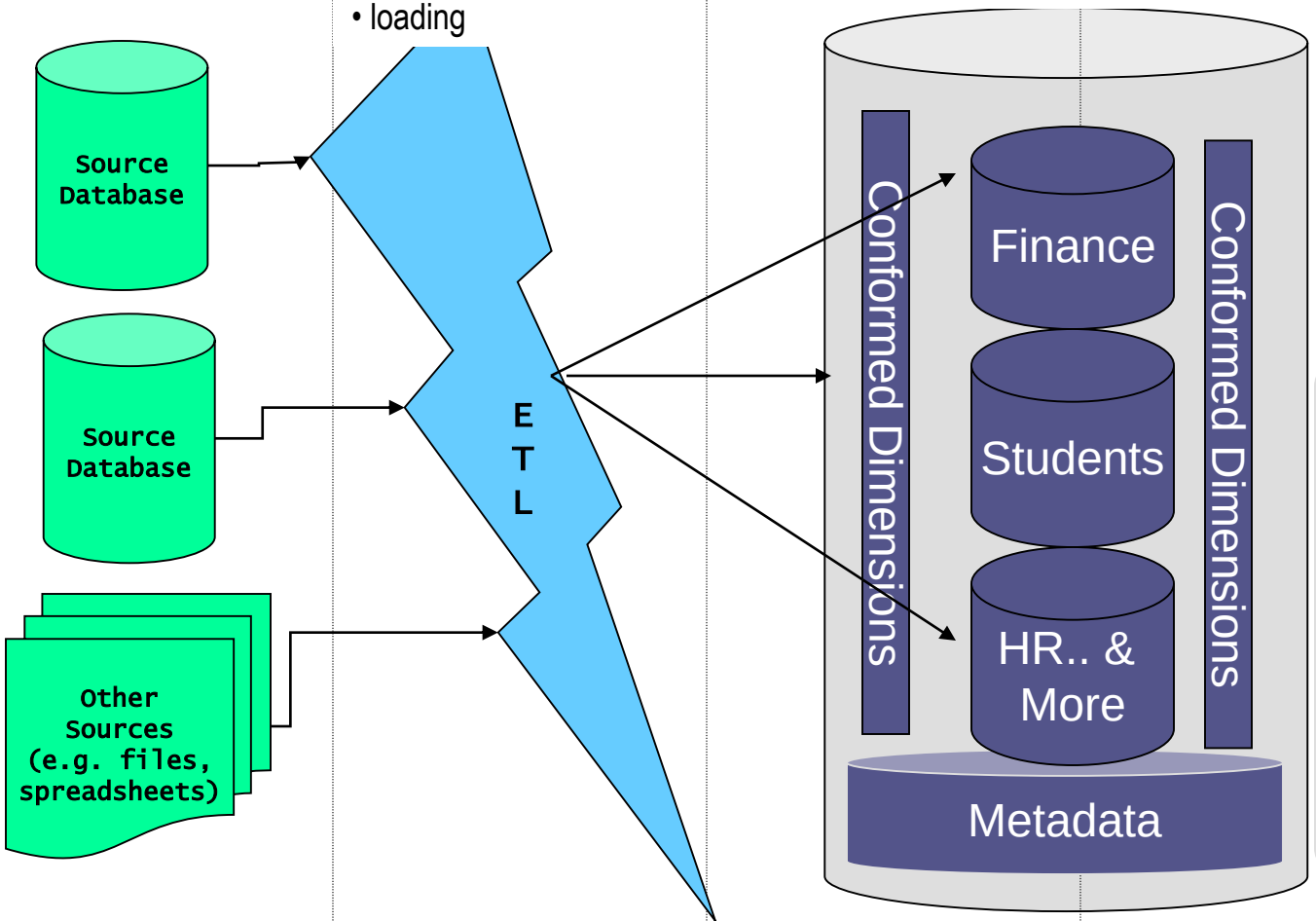
- central repository
- subject-based data marts
- Link through Conformed dimensions
- metadata

Subject Specific analytics



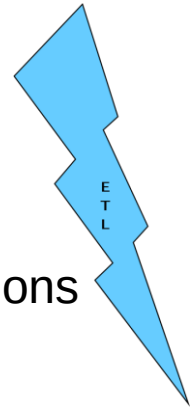
- ✓ Modeling
- ✓ Analytics
- ✓ What If

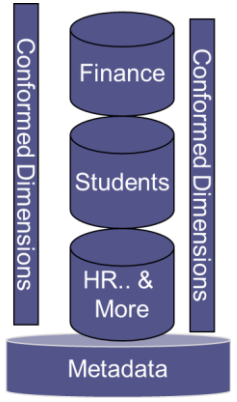
- ✓ Dashboards
- ✓ Interactive Reports
- ✓ Ad-Hoc
- ✓ Alerts



TECHNICAL ARCHITECTURE: KEY POINTS FOR LEADERSHIP

- **Defining availability and frequency**
  - Ex: NYU's Global nature calls for 24X7, daily loads
- **Extraction Transformation & Loads:**
  - Capturing inconsistent and erroneous data with embedded notifications
  - Capturing Business definitions
  - Automated Reconciliations
- **Data Warehouse**
  - Star Schemas with Conformed Dimensions
  - Designed for consumption by business users: Watch for Intuitiveness
  - Atomic Level
  - Partitioned and Indexed for data retrieval: *Performance, Performance, Performance*
  - Preserving History :: Slowly Changing
  - Certified





Large or Small Implementation: We Need a Framework

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WHY IS DATA GOVERNANCE SO HARD?

Lack of a Quality Foundation	Lack of Business Buy-In	Lack of Business and IT Alignment
Organizations don't know where to start with data governance efforts and lack the tools for ongoing tracking against quality goals	Data Governance programs struggle for acceptance with the business or fail outright due to lack of attention to data quality issues	IT and business look to each other to resolve data issues, with neither willing to step up and take ownership

Proposition of The Perfect Union: The Practical

Data Warehouse (DW)/Business Intelligence (BI) & Data Governance

DATA WAREHOUSE IMPLEMENTATIONS HIGHLIGHT DATA ISSUES

PRACTICAL: DATA GOVERNANCE AND UNIVERSITY DATA WAREHOUSE (UDW)

Data warehousing tends to bring (previously veiled) data integrity issues and conflicts into the sunshine. Therefore demands a solid and repeatable process for conflict / issue resolution.

Data Governance must be established, incubated and mentored that reflect the University's business rules, definitions, history and culture.

ACCURATE, RELIABLE, CONSISTENT, RELEVANT INFORMATION

Data Governance consists of policies, processes, technology, and accountability to deliver accurate, reliable, consistent, and relevant information in the university data warehouse.

Policies

- Defines roles & responsibilities
- Outlines the need for business processes to identify and fix erroneous data within 4 business days or the elevation of the problem
- Enforces mandatory training
- Enforces the need for common definitions and metadata
- Outlines the guiding principle around data security

Processes

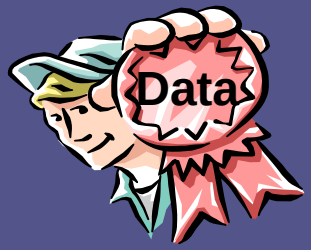
- Processes to identify and correct erroneous and inconsistent data
  - Based on the business rules, technical scripts will be developed to identify data issues
  - Using technology each operational area that collects data will establish business processes to identify and fix errors
- Processes to capture and maintain metadata (business definitions: data dictionary)
- Processes for establishing and overseeing security access

Accountability – Clearly defined roles and responsibilities around data management

- Data Trustees
- Data Stewards
- Subject Matter Experts (SMEs) or Content Experts
- Data Custodians (IT)
- Chief Data Officer (IR)

Technology

- Built-in reconciliation processes with automated error notifications
- More intuitive data structures and tools for business processes to capture data issues
- Means to capture and access metadata (business definitions: data dictionary)



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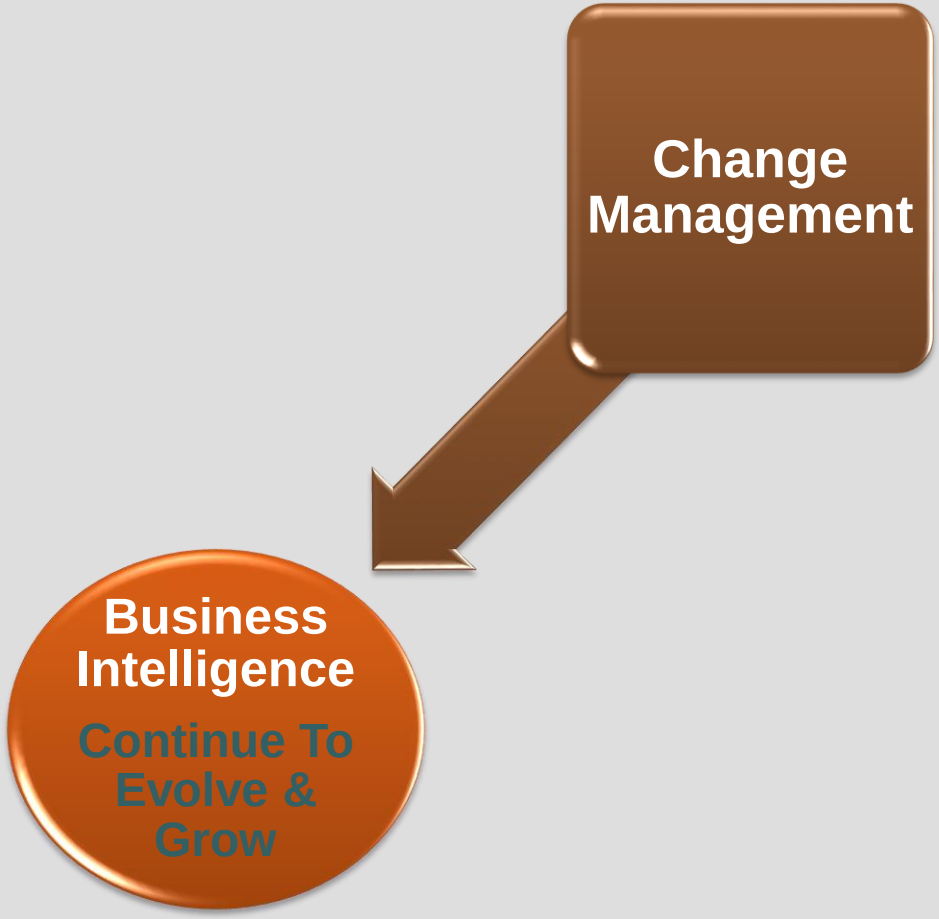

CHANGE MANAGEMENT FOR BI – THE PRACTICAL

Analyzing the change impact of the BI Initiative and associated activities…

Awareness	***Desire***	***Knowledge***	***Ability***	***Reinforcement***
Are schools/offices and users aware of the project and the business reasons for the project?	What are the users' compelling reasons to support the change or object the change?	What are the skills and knowledge users need to support the change during and after the project?	What are the barriers that may inhibit users to realize the change?	What will help sustain the change? What incentives may help make the change stick?

Sample Activities for each Phase

▪ Project Kickoff ▪ User Survey ▪ Interviews with individual schools ▪ Schools nominations to serve at the Operating, Working Committees & Focus Groups ▪ Monthly, Bi-Weekly, Weekly updates	▪ Regular project updates (FO Forum, Website) ▪ Project presentations ▪ Demo ▪ Status Meeting Updates ▪ Change Readiness Scorecard updates	▪ Training courses ▪ User Acceptance Testing ▪ Workshops/Demos ▪ Change Readiness Scorecard updates	▪ Training courses ▪ Regular project updates (email, website) ▪ Road shows ▪ Monitor usage ▪ Target messaging	▪ Launch Support ▪ Quick Reference Guides/FAQs ▪ Refresher Training ▪ Newsletters ▪ Users Forums ▪ Monitor usage

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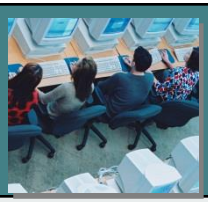
TRAINING

- **What:** Front-end applications, Data, Policies, Business Processes
- **Mandatory**
- **Offered continuously**
- **Blended:** Covers various levels of difficulty & Offered through Various venues:
  - On-line
  - In Classroom
  - Workshops with Business Process owners
  - Collaborative environment: allow users collaborate & learn from each other
- **Measured** for Effectiveness & Continuously Improved
- **Tied to Support Model**

BLENDED LEARNING APPROACH

						
Training Method	**Computer Based eLearning**	**Facilitated Learning Labs**	**Classroom Instructor Led Training**	**Subject Matter Workshops**	**Virtual Instructor Led Training**	**Community Collabora-tion**
User Types	**Standard Report and Dashboard User** **Ad Hoc Reporting User**	**Standard Report and Dashboard User**	**Ad Hoc Reporting User** **Advanced/ Power User**	**Ad Hoc Reporting User**	**All Reporting User**	**All Reporting User**

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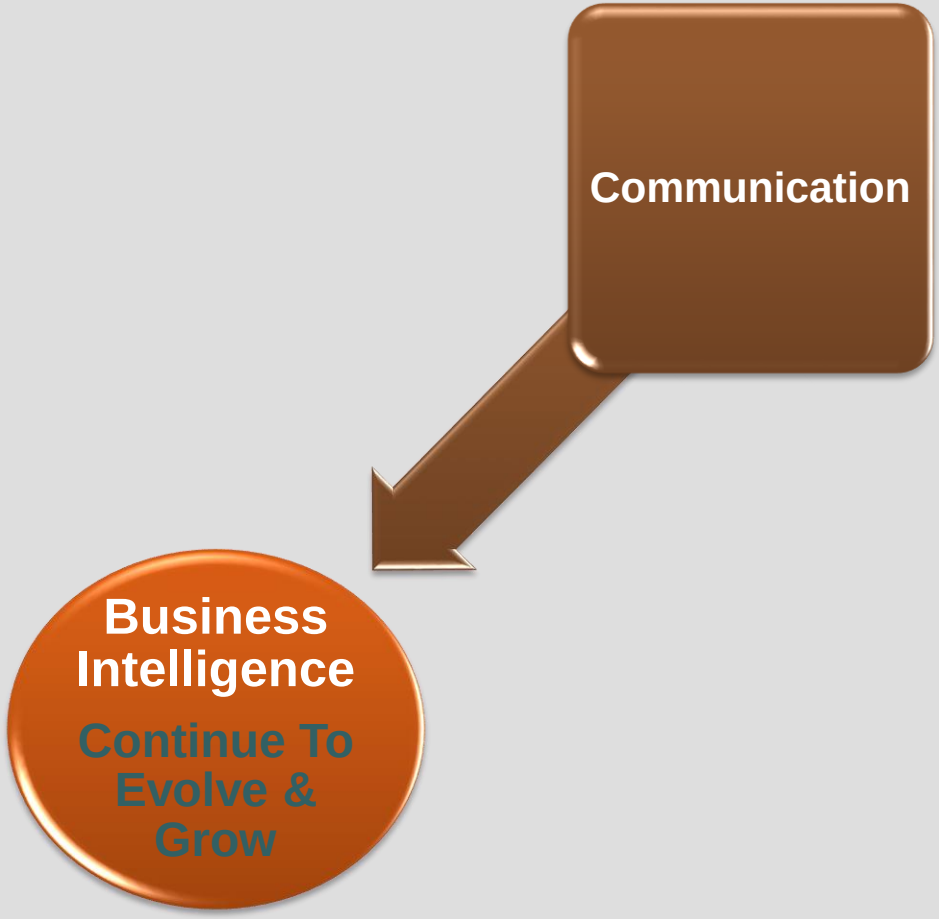

COMMUNICATIONS PLANNING

Target Audience / User Groups & Committees	Identify key stakeholders: Executive Sponsors, FO, Business Managers, Power Users, Analysts, Standard Report users, Focus Groups, Core User Team, Beta Schools
Communication Objectives	❖ Build awareness of the BI initiative among a wide but defined group of audiences and user groups: FO, Deans, PI, etc. ❖ Secure commitment of the project goals. ❖ Encourage participation in various Committees
Communication Objectives / Key Messages	Content of communication: Informational, Motivational, Influential, Persuasive
Timeline	Communication Events: • Communicating during each phase of the project • How often • Key events/activity • Key dates
Communication Method	Channels of Communication: Emails, Websites, Events (Project kick-off, Workshops), Presentations (at various key meetings)
Responsibility / Messengers	• Who: Creates, Approves, Distributes
Success Criteria	Evaluate Success of Communication Objectives: • Identify feedback channels • Have we reached the right people? • Did they understand the message?

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SUPPORT

Operational Support

SLA

SLA

SLA

Decision Support Group

- *1st Level Issue Resolution.*
- *Provide ongoing Training and Communication*
- *Global Support*

Reporting, Analysis & Training
Operational Support Tier 1

Data Stewards
Data Issue Resolution and Support:

- Budget & Financial Planning
- Treasury System
- General Acct & Reporting
- Bursar
- SPA
- Purchasing
- AP
- Payroll

Data Custodians
Systems Issue Resolution and Support:

- Fame
- DRM
- Campus Solutions
- Human Resources
- UDW+
- Hyperion
- Advance

Data and Systems Support
Tier 2

Data Trustees

- Establishment of data management policies
- Establishment of data management procedures
- Serves as escalation point

Policies and Procedures Support
Tier 3

Responsibilities

- *Dedicated case manager*
- *Constant direct and proactive communication with end users*
- *Over time, become experts in FIN reports and business processes- answer 80% of reporting questions*
- *Available 24/7 : Onsite in WSQ and AD*
- *Liaison to the reporting community and the business*
- *Measure the efficiency and accountability of the support process*
- *Direct daily contact with Tier 2*
- *Maintain a knowledge base*
- *Assist in report development and enhancements*
- *Deliver training*

Tier 1

Stewards:

- *Accountable for data integrity*
- *Monitor, address and oversee efficient resolution to any data issue*
- *Certify centrally created standard reports and dashboards*
- *Own and maintain meta data*
- *Commit to the DSG with direct daily contact*
- *Immediate communication to Tier 1 of any data issue*
- *Responsibilities reflected in job description*

Custodians:

- *Accountable for system performance*
- *Commit to the DSG with direct daily contact*
- *Immediate communication to Tier 1 of any system issue*

Tier 2

- *Act as escalation point*

Tier 3

SUMMARY

- Universities are going through transformation
- Demand for Information and Analytics will continue to grow
- Critical Success Factors for BI
  - Setting the right expectations:
    - BI is not a technical project
    - BI is not a Project
  - Strong Sponsorship
  - Long term strategy and planning with short term deliverables
  - Evolutionary in nature: It's a Program