

***Transformation of the Current IT Organizational Design  
Model -  
An Exploratory Discussion***

**Final Report**

**November 6, 2013**

Doug Foster, Pam Horne, JoAnn Miller, Mitch Springer  
Subcommittee of the Operational Oversight Committee,  
under Gerry McCartney, V.P. Information Technology

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## **Operational Oversight Committee (OOC) Round #5 Project Team Members**

- ❑ Doug Foster
- ❑ Pam Horne
- ❑ JoAnn Miller
- ❑ Mitch Springer (Team Lead)

## **Product Delivery Dates**

- ❑ Teams established: 7/01/2013
- ❑ Finalize Project Scope and submit: 7/22/2013
- ❑ Interim report due: 8/26/2013
- ❑ Executive Summary due: 11/13/13
- ❑ Final report due: 11/15/2013

## Executive Summary

The Transformation of the Current IT Organizational Design Model subcommittee of the Operational Oversight Committee, under Gerry McCartney, V.P. Information Technology, was formed to better understand and frame the factors impacting the transformation of the current Purdue University Information Technology (IT) discipline-specific organizational design model. The committee reviewed the following areas of attendant interest prior to making recommendations and suggesting opportunities for further study.

- ❑ What are the theoretical and experiential efficiencies and effectiveness of centralized versus decentralized organizational design models?
- ❑ What are the units of IT bifurcation within the academy and their associated interests (differentiation of branches)? And, can bifurcated unit positions be differentiated from their true underlying interests?
- ❑ What are strategic to tactical IT organizational model perspectives, and, what impact does that have on model determination?
- ❑ What discipline-specific campus examples exist of currently employed functional matrix models?

Organizational design models attempt to align the three variables of accountability, authority and responsibility to gain maximum efficiency and effectiveness for the organization. A direct effect of increased efficiency is a reduction in costs, frequently referred to as cost avoidance or cost savings. Our final determination of an appropriate model is premised on cost savings, versus the alternative of cost avoidance. An section was added to this report differentiating cost savings from cost avoidance.

## Recommendations

Based on the findings of this study, there are insights gained which provide valuable suggestions toward future success.

- ❑ Given the above shared interests, as well as similar interests, the organizational model most likely to satisfy both cohorts would appear to be a matrix model.
- ❑ The centralization (matrix model) of information technology personnel will require a collective will and firmly executed decision authority on the part of Purdue's senior leadership.
- ❑ To successfully implement the suggested organizational model change, it is imperative we address and differentiate between operational and tactical objectives of the academic units. The operational objectives should focus on "what I need to do", versus the "how to do it" focus of tactical objectives.
- ❑ The proposed matrix approach requires the establishment of "communities of practice" attendant to key hardware and software solutions.
- ❑ Common computing hardware and software is not simply a practice used in business and industry, but one which will provide significant efficiency and effectiveness as well as cost savings to Purdue University and its academic units.

## Scope Statement

The Transformation of the Current IT Organizational Design Model subcommittee of the Operational Oversight Committee, under Gerry McCartney, V.P. Information Technology, has been formed to better understand and frame the factors impacting the transformation of the current Purdue University Information Technology (IT) discipline-specific organizational design model. The committee will seek insight into:

- ❑ Efficiencies and effectiveness of centralized versus decentralized organizational design models
- ❑ Elements of IT oriented bifurcation within the academy (differentiation of branches)
- ❑ Cohort considerations for use
- ❑ Strategic to tactical IT organizational model perspective
- ❑ Examples of currently employed functional matrix models

The final report will document the findings of this committee with recommendations for further study.

## Context

Purdue University has the opportunity under the leadership of President Daniels to continue to be and enhance our reputation as good stewards of state appropriations and student tuition. In response to declining state revenues and student tuition freezes, Purdue is poised to lead the nation in becoming a model for efficiency and improved effectiveness.

On January 18, 2013, President Daniels's Open Letter to the People of Purdue, makes explicit reference to higher education as we know it being poised for big change. He highlights treatises on challenges faced by higher education today:

- ❑ College costs too much
- ❑ Administrative costs have run up the cost to students without enhancing the value of education
- ❑ Rigor has weakened
- ❑ The system lacks accountability

President Daniels goes on to say “..the operating model employed by Purdue and most American universities is antiquated and soon to be displaced...” In response to these many concerns and criticisms, President Daniels offers suggestions for collective thought and action, to name a few:

- ❑ Excellence – “Purdue is not its buildings, or even its wonderful past or traditions ...this would be a great university if it met in a tent.” Purdue is its faculty and students and what happens when brought together **effectively**.

- ❑ Affordability – “...every university community should embrace the shared responsibility **to reexamine current practices and expenditures** with a determination to keep its tuition and fees within the reach of every qualified student”
- ❑ Shared governance – “..shared governance implies shared accountability. It is neither equitable nor workable to demand shared governing power but declare that **cost control and substandard performance in any part of Purdue is someone else’s problem**. We cannot improve low on-time completion rates and maximize student success if no one is willing to modify his schedule, workload, or method of teaching”
- ❑ Common purpose – “...**the widespread duplication of identical functions** can work against the common goal we must have of affordability and liberating resources for new investments in faculty and facilities... many choices will necessitate a communitarian outlook that consciously places the interests of the overall university first”

President Daniels’s Open Letter to the People of Purdue makes reference to being good stewards, creating efficiencies, becoming more effective, reexamining current practices and expenditures, and addressing the duplication of support function services. These and many other references to our multiple email systems or web development tools are indicative of areas for improvement and alignment to our current mission.

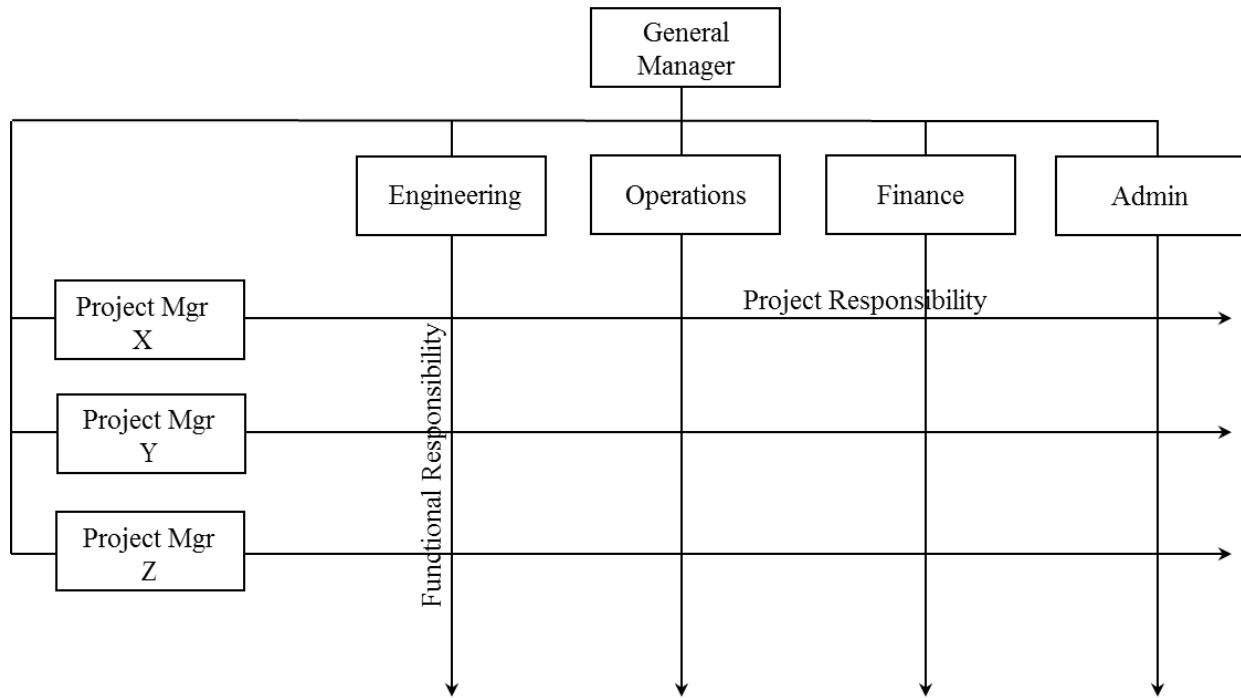
The purpose of this report is to open dialog on one aspect underlying these many references, namely, the duplication of resources and increased costs attendant to the bifurcation of Information Technology personnel between the central structure and the academic units.

## **The Matrix Organization Design Model**

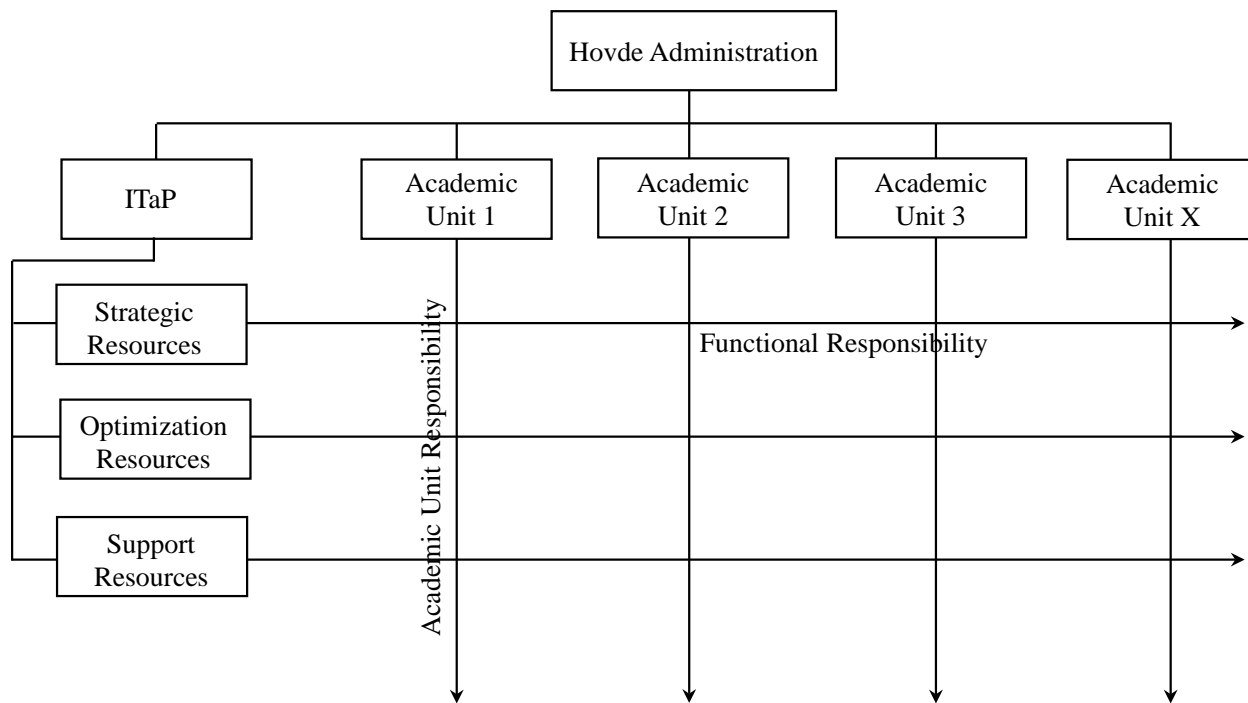
The manner in which an organization groups work and people is referred to as an organization’s structural design, or its organizational design model. As an organization evolves from a small entrepreneurial entity to a mature and evolving on-going concern, so too does its organizational design model evolve. From a theoretical and experiential perspective, Appendix A discusses the evolution of these many organizational models and their attendant advantages and disadvantages.

Premised on the conclusions and recommendations of this report, the matrix organizational design model is discussed at this time for reference purposes.

The matrix structure is a hybrid organization that attempts to balance the use of human resources as people are shifted from one project to another. It can be viewed as a project organization superimposed over a functional organization. The figure below is an example of a typical matrix organizational structure.



Taking the above and converting it to terminology specific to higher education and Purdue University specifically reflects the model below.



The matrix structure is more complex than either the traditional or product-oriented structures. To this end, it requires basic ground rules to be successful:



- ❑ Participants must spend committed time in an academic unit; this ensures a degree of loyalty.
- ❑ Horizontal as well as vertical channels must exist for making decisions.
- ❑ There must be quick and effective methods for conflict resolutions.
- ❑ There must be good communication channels between leaders.
- ❑ All leaders must have input into the planning processes.
- ❑ Both horizontal (ITaP) and vertical (academic unit) leaders must be willing to negotiate for resources.
- ❑ There should, ideally, be no disruption due to dual accountability.

### **Matrix Model Advantages**

Advantages of the matrix organizational structure are predominantly focused on efficiency and cost savings, this through a focus on the knowledge, skills and abilities of people and the efficient allocation of those people across academic units:

- ❑ Promotes career continuity and professional growth, as each information technology individual has a home discipline outside of the academic unit; meaning, the individual can be retrained and redeployed in other Information Technology (IT) required capacities.
- ❑ Perpetuates consistent and coherent technology. By this, functional IT resources gain the benefit of a functional strength of knowledge and skills, which can be transferred to the academic unit.
- ❑ Resources may be retrained and redeployed without an academic unit having to take personnel actions. The IT function, as the home department of all IT personnel, assumes any and all personnel actions.
- ❑ Resources may be used in multiple shared capacities. This supports the level and full loading of each individual, versus partial loading expanded to fill a full-time load requirement.

### **Matrix Model Disadvantages**

Disadvantages of the matrix organizational structure include:

- ❑ Dual accountability of personnel. This is perhaps the biggest threat to this type of structure. Personnel will generally favor whoever it is that completes their performance review and subsequently has control over their income adjustments. Confusion here can derail a collaborative effort.
- ❑ There are continuously changing priorities, especially on the part of the academic units who control the resources.
- ❑ Employees may feel confused about loyalty.

## Cost Avoidance versus Cost Savings

Cost avoidance is not the same as cost savings. Cost avoidance that does not directly lead to a cost savings may in fact actually lead to a cost increase.

An example best illustrates this difference. If a process is made more efficient, such that it used to take three people two hours each, or six person hours in total, and now takes one person one hour, that is a cost avoidance, through a process improvement, of five person hours. So, it may be stated that the organization, through process improvement, has saved five person hours. If those saved five person hours are simply reapplied to other areas of work, then there are no real savings, simply a cost avoidance through the improvement of one process.

Real savings, in contrast, are savings that have a direct reduction to the bottom line performance of the organization or unit. To be short, if the five person hours saved in our above example resulted in not paying someone for the five person hours, then that saved cost is realized in the bottom line of the financial statement. In other words, an organization or unit could give back to the oversight entity the equivalent of five person hours worth of funding.

Cost savings, then, are real and have a direct impact on the bottom line of the financial statement. Whereas, cost avoidance may result in an improvement contributing to increased efficiency or effectiveness, but does not necessarily result in real cost savings; i.e., a realized reduction in expenses against an activity base, which may be returned to a parent organizational entity.

Cost savings may be realized through one, another or combination of activities. Namely:

- ❑ A unified approach to common hardware and software platforms.
- ❑ Reduction in required new hires – this is a reduction through attrition and consolidation of lower-skilled positions into fewer, more highly-skilled positions.
- ❑ Recognition and personnel actions relative to a skills mix issue – a model frequently used in business and industry and premised on Jack Welch’s General Electric model put forth in his 2000 report to shareholders, which advocates the churning of the bottom 10% of personnel on an annual basis.

Converting from one organizational design model to another, may, and should, result in cost savings. This is the premise of the remainder of this report.

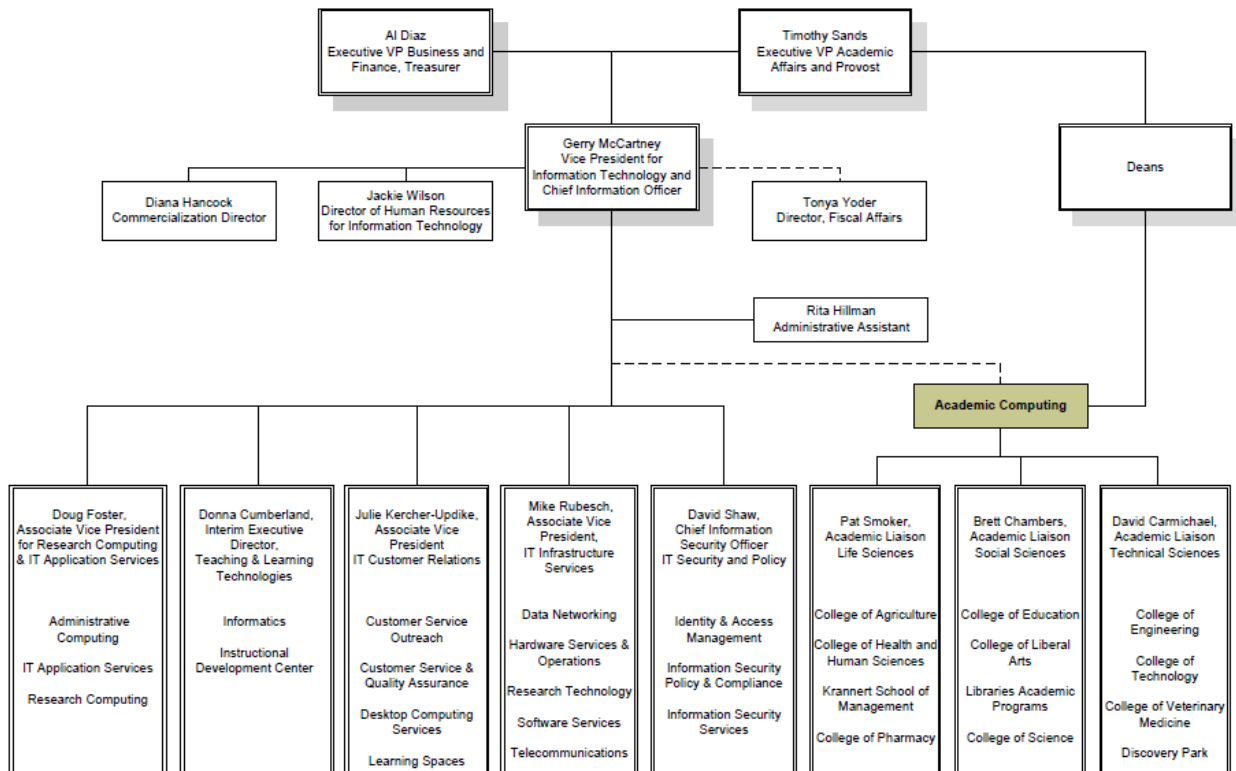
## The Current Purdue IT Model

At present, the Purdue University human resources of the Information Technology (IT) discipline are centralized for administrative units, and, decentralized and reside at each academic college. Each academic unit owns these academic unit specific IT resources; meaning, each academic unit determines how many IT people they need, what services they are to perform, and, is responsible for their training, career progression and compensation. It is the decentralized

portion of the IT human resources that is the target of this report. As discussed above, this form of decentralized model aligns clearly to the Product Design Model.

Below depicts the current IT organizational model across the university and its many academic/administrative units.

In the case of academic units there exist a logical dash-lined relationship between the IT resources of the academic units and the Purdue University CIO (central organizational head). This dashed-line relationship is used to differentiate the centralized portion of the IT organizational model from the decentralized academic unit portion.



Last revised 5/1/2013

To this end, this current model has similar advantages and disadvantages, again as previously discussed in the section describing the Product Design Model and summarized below.

### Current Decentralized Academic Computing Purdue IT Model Advantages

- ❑ Strong control by a single academic unit

- ❑ Rapid reaction time. The academic unit has all of the resources required to be successful, and can command these resources in any way required to satisfy their changing needs
- ❑ Encourages performance, schedule, and cost tradeoffs within the academic unit
- ❑ Personnel are loyal to a single academic unit
- ❑ The academic unit interfaces well with outside units. In this model, a single academic unit is given primary responsibility for interfacing with other units, both externally and internally.
- ❑ Good interface with customer – a single academic unit (e.g., Science) interfaces well with students, alumni, donors and research entities
- ❑ Strong communication channels. It helps in this type of structure that all employees have a common goal: to produce a single product or brand of product. This builds a unified allegiance to a single cause.

### **Current Decentralized Academic Computing Purdue IT Model Disadvantages**

- ❑ Inefficient use of resources; decentralization creates a duplication of effort. This may be the single greatest argument against this type of organizational structure. The fact that, in the above example, IT personnel are duplicated for every academic unit implies full-time employees are being used where part-time employees may only be required.
- ❑ Does not develop strong functional technology. Single individuals performing a single function within an academic unit do not have the time or the breadth of exposure to see what the latest and best methodologies, techniques, and practices may be; as can be learned from other academic units or from a centralized discipline.
- ❑ No direct connection with centrally-supported enterprise applications. This is problematic in three ways: 1) there may be an already-implemented or planned enterprise application that can for the most part meet the academic unit's needs, 2) if one academic unit has a specific need for new functionality, chances are others do as well and the need should be explored centrally, and 3) if a unit-specific application requires a connection to enterprise data, that work effort is not centrally prioritized.
- ❑ Does not prepare for future business. Without functional oversight, the entire academic unit is focused on design, development, and delivery of a single product or service. If greater vision does exist, it typically is limited to similar, or like, services. In academic unit terms, academic units are limited in their services received with little opportunity for cross-fertilization of IT services available
- ❑ Less opportunity for technical interchange of IT personnel among centralized or other academic units
- ❑ Minimal career opportunity and continuity for academic unit IT personnel. In other words, there exists limited career growth potential within the singularly focused academic unit.
- ❑ Difficulty in balancing workloads as projects phase in and out. Individuals may not have work in a particular time frame, but must be kept busy doing something until that

specific type of function is again in demand; this, assuming IT subject matter expertise is a focal point.

## **Primary Consideration for Purdue IT Model Selection**

With primary considerations for efficiency and cost avoidance/savings, the two models most likely to satisfy these requirements are the traditional and the matrix models.

If there exist an additional requirement for academic unit control of IT resources, this premised on transitional anxiety, then a matrix model would most readily satisfy the required needs over the pure traditional/functional model.

## **Cohort Considerations for Use**

There exist to two bifurcated primary cohorts when considering the university-wide organizational model for distribution of IT human resources; the central university IT organization and the academic units.

### **University Centralized IT considerations for use**

It is the interest of the centralized IT organizational model to achieve the following:

- ❑ Create a common set of policies, procedures, guidelines and practices
- ❑ Create a consistent and coherent knowledge and skill base for each system (operating system, database management system...) and applications tool
- ❑ Promote career continuity and professional growth within the IT discipline
- ❑ Provide continued employment through the reassignment of human resources – this is accomplished through schedule level-loading across academic units
- ❑ Reduce university costs through more efficient utilization of IT human resources

### **Academic Unit Considerations for use**

It is the position of the academic units to achieve the following:

- ❑ Academic-unit specific knowledge
- ❑ Control of required IT resources
- ❑ Adequate response time from IT personnel

Relative to academic unit specific knowledge, the question arises what knowledge is central to the information technology department; i.e., is it academic unit specific knowledge (math, history, science...) or information technology specific knowledge (operating systems, database management systems, applications...)? It would appear on the surface the knowledge most applicable to information technology personnel is information technology specific knowledge. IT personnel need to understand how an academic unit intends to use the information technology, but does not need to have the breadth or depth of academic unit discipline specific

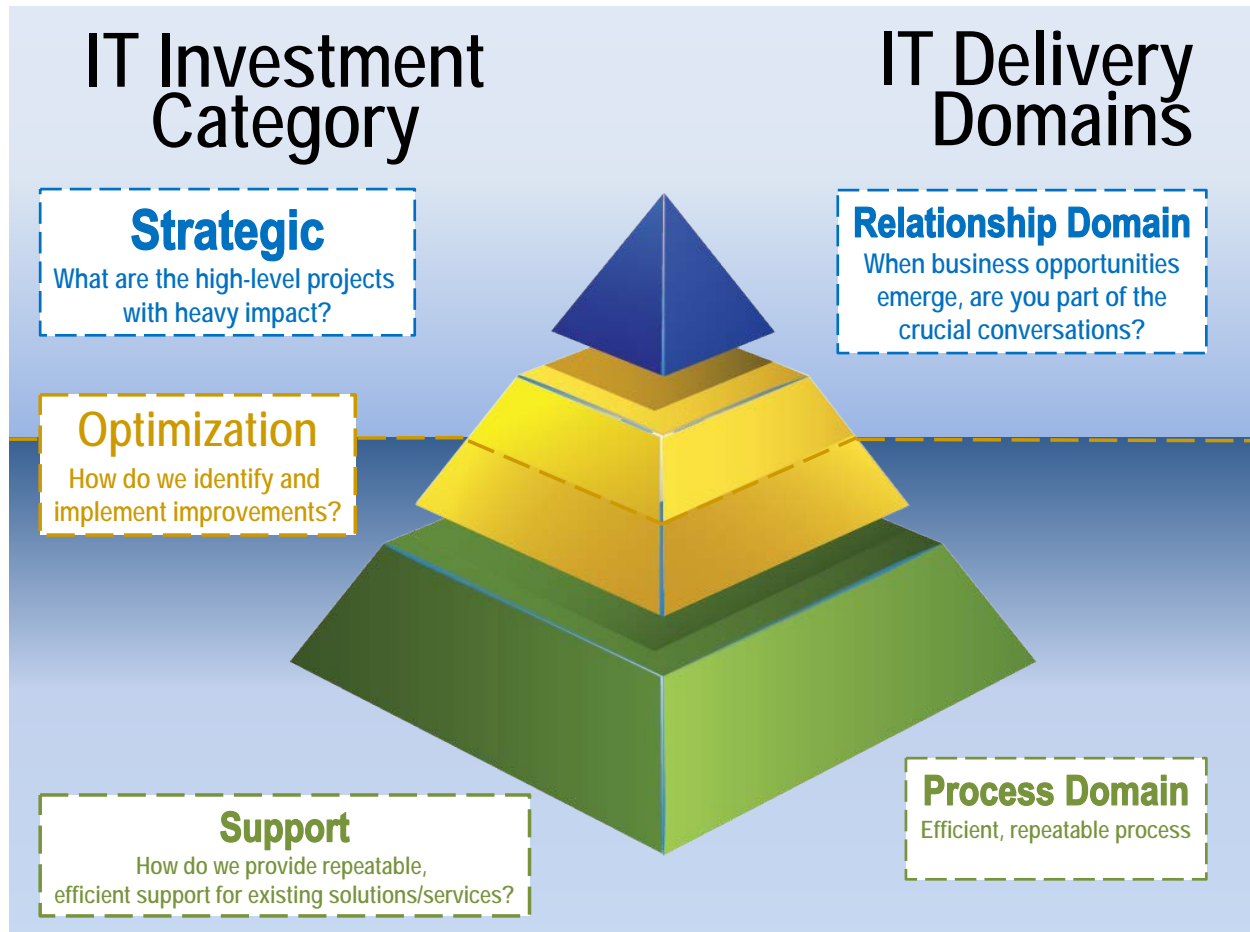
knowledge. To this end, the matrix model seems most appropriate with information technology and all resources aligned to an information technology discipline and subsequently assigned as required to support an academic unit.

Control of IT resources is a double-edged sword. Control of personnel, while a typical management response for accomplishing tasks within cost and schedule, fails when work is no longer necessary or changed and a skills mix materializes. For example, should an academic unit desire to move to another web development platform, current IT personnel might prove most unskilled. In this instance, it would be more appropriate to allow the existing IT personnel to return to their IT functional stovepipe and be offered yet other IT personnel with the appropriate skills to move the academic unit in the new direction they have selected. This ability to move personnel to and from a functional stovepipe lends itself to a matrix organizational design model.

Response time of an IT function and its assigned personnel to the needs of an academic unit is of major concern to the academic unit when something needs to meet schedule criteria. This topic forms the underlying premise in some instances for academic units seeking control of their own IT resources. This topic is more appropriately an issue for resolution between the IT functional stovepipe and the lead of the academic unit; and, should not be a criterion for changing an organization's design model.

## **Strategic to Tactical Information Technology Organizational Model Perspective**

The current Information Technology perspective for the delivery of future services is depicted in the below figure. At the bottom of the pyramid is Support, followed by increasingly greater levels of application intelligence and relationships, Optimize and Strategic Innovation.



At the lowest level, “support”, the objective is to manage cost, schedule and performance for those applications and the attendant user support requiring standardized and routine servicing. Efficiencies and increased effectiveness is accomplished through requirements understanding and the subsequent mapping of standardized solutions to those many identified requirements. Process improvement lies at the root of cost reductions and increased efficiency and effectiveness. At this level, customer service is less relational and more transactional.

At the next higher level of complexity resides “optimize”. Optimize is where increased efficiency is achieved through cross-application and cross-platform software and hardware solutions. At the optimize level simple off-the-shelf solutions are not sufficient for customer needs. Optimize is considerably more software engineering oriented, where hardware and software solutions are specifically created. Optimize requires a much deeper understanding of application-specific software and expertise. It is not uncommon these more complex solutions will require systems level understanding versus the higher application-level knowledge required at the “support” level.

Where “support” is transactional and requires basic application oriented knowledge and solutions and “optimize” is systems oriented, “strategic innovation” is almost entirely about customer

relationships; that being understanding the nature of work being performed by the academic-unit and being able to tailor very concise software and hardware solutions to accommodate these many needs. Support is the first line of interface for academic units seeking “how-to” knowledge for non-routine solutions to requirements. At this level, the basic requirements of the academic unit may not be obvious even to the academic unit. Requirements identification, analysis and subsequent allocation to software and hardware IT services takes place at this level.

In its current form, this model of strategic to tactical solutions for end users is idealized through a matrix organizational design model. In other words, at all levels personnel are situated within an information technology discipline-specific functional stovepipe and assigned to academic units through the staffing function of this functional stovepipe. This pooling of human resources possesses the advantages described above in the matrix organizational model section of this document. The specific assignment of a given individual to an academic unit at the highest level of the pyramid, purportedly serves the needs of that academic unit without, on an as needed basis, without the required level-loading of work typically required of “owned” resources. This model, therefore, promotes efficiency and attendant cost reductions.

### **Examples of Currently Employed Matrix Models**

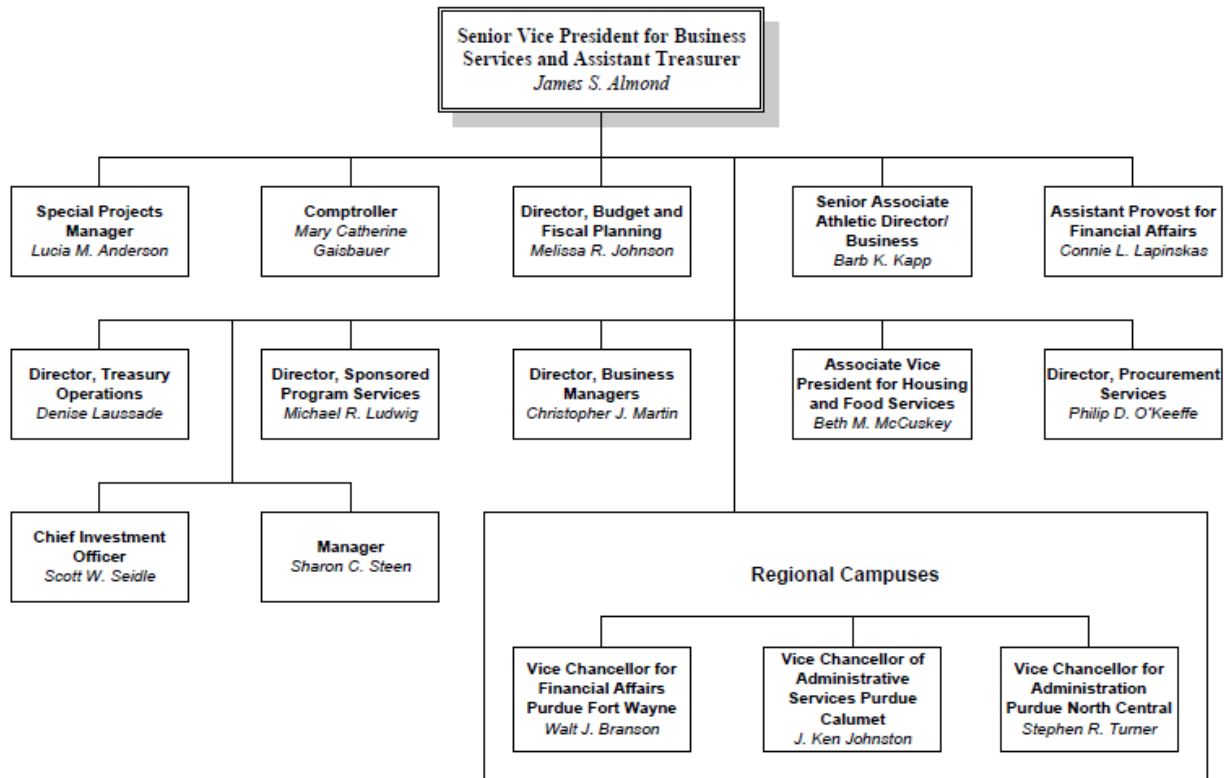
At present, within the Purdue University main campus in West Lafayette, there are two discipline-specific functions which employ the above described strategic to tactical information technology perspective; namely, Business Services and Human Resources.

Reference to Business Services and Human Resources is strictly to make reference to like-minded organizational model strategies. This report wishes to differentiate between organizational strategy and organizational execution against strategy. To this end, the intent is not to purport or make reference to effectiveness of these organizations; as this is not the focus of this study.

### **Business Services Matrix Model**

Below depicts the organizational model for the Purdue University Business Services function on the campus in West Lafayette.





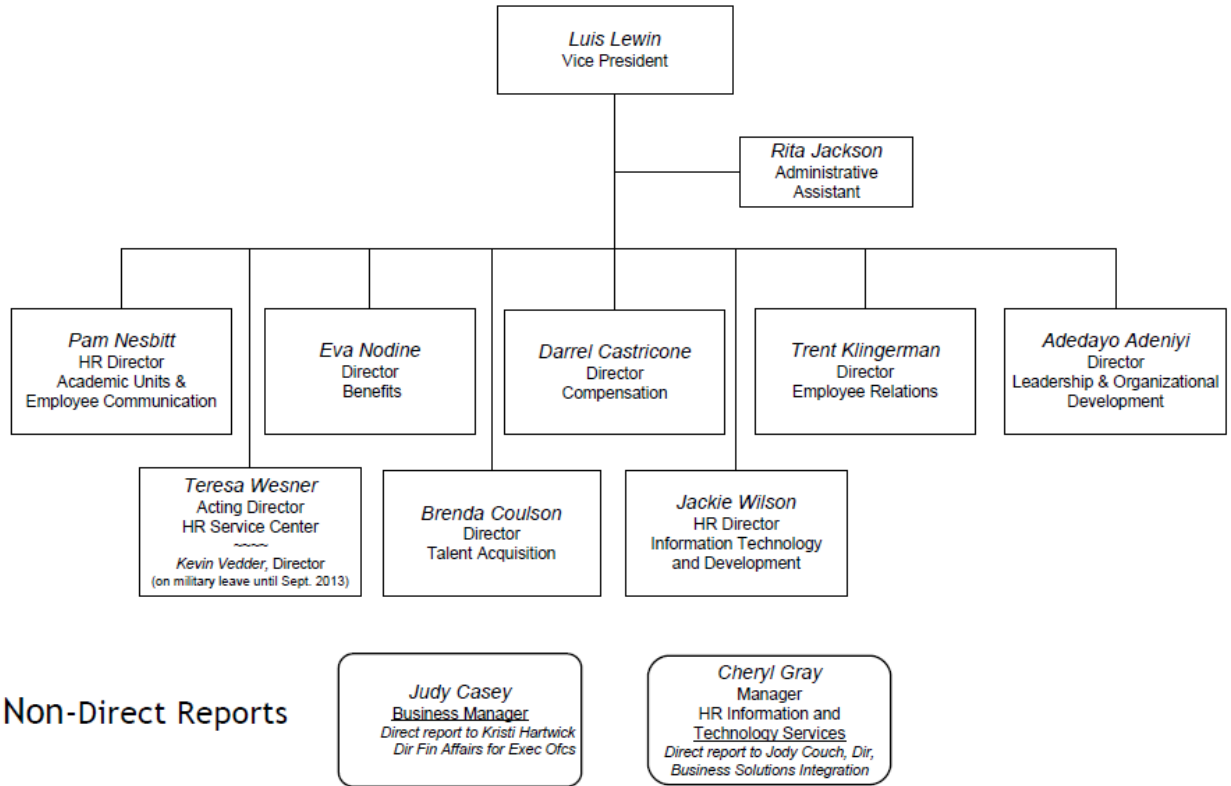
Updated 10/10/2012

From the above, Business Services is organized as a centralized organization with Business Managers assigned to academic units on a dashed line, through the Director of Business Managers position.

This model is a discipline-specific instantiation of the above described strategic to tactical IT perspective. Business Services fully employs a matrix design model at the academic unit level.

### Human Resources Matrix Model

Below depicts the Purdue University Human Resources organizational chart for the main campus in West Lafayette.



April 2013

As can be seen from the above, like the Business Services function, Human Resources also utilizes a matrix structure to serve the needs of the academic units.

The Human Resources function assigns individuals to serve the HR needs of the academic units on a dashed line basis. The HR professionals who serve these many needs of the academic units are solid line to the HR functional stovepipe, just as Business Services.

This model is a discipline-specific instantiation of the above described strategic to tactical IT perspective. Human Resources fully employs a matrix design model at the academic unit level.

### ITaP Administrative Computing Matrix Model

The Information Technology function, residing at the university level, has recently restructured the organizational model it employs to service one of the major units of Purdue; namely, Administrative Computing. Administrative Computing used to have an organizational model similar to the academic units. Recently, that model was changed to reflect the Information Technology desired model discussed above in the section titled “Strategic to Tactical Information Technology Organizational Model Perspective”. This change is depicted in the Information Technology organization chart presented above. While it is too early to claim complete success in this organizational model transition, it is apparent at this time that success

should prevail; this as the target populous is indoctrinated into the specifics of the new model, as well as the advantages attendant to this new organizational model become more readily apparent.

## **Successful Cross-College Collaborative Enterprise Solutions**

Two examples of cross-college collaborations and successful enterprise solutions are depicted between the College of Engineering (CoE) and College of Technology (CoT). The two examples are the assumption of the CoT Technology Network (TCN) within the Engineering Technology Computing (ECN), and, the forthcoming collaboration of the CoE Professional Education (ProEd) and CoT ProSTAR organizations. Both of these examples demonstrate the efficiency, effectiveness and cost savings directly attributable to enterprise versus decentralized solutions.

### **Merger of ECN and TCN**

In the fall of 2010, after nearly eight months of discussion, the College of Engineer's Computing Network assumed responsibility for the College of Technology's Computing Network and subsequent needs. Notice of this assumption was announced through many mediums and placed on the Purdue University website as follows:

*Information technology support in the College of Technology and the Engineering Computer Network in the College of Engineering are merging as part of the Campus Information Technology Plan.*

*The step was announced in a recent memo from Dennis Depew, dean of the College of Technology; Leah Jamieson, the John A. Edwardson Dean of Engineering; and Gerry McCartney, Chief Information Officer and Vice President for Information Technology and the Olga Oesterle England Professor of Information Technology. In it, they said the merger will allow their areas to better share knowledge and expertise, leverage infrastructure and increase efficiency.*

*The transition will take place over the next year, but all IT staff in the College of Technology are expected to transition into ECN within the next three months. The College of Technology will maintain an Ad-Hoc Advisory Board, which will provide input to ECN and governance over the college's IT needs.*

*The College of Engineering is developing an IT governance plan to address operational oversight and strategies for ECN.*

The benefits of the merger were reflected in efficiency, effectiveness and cost. The cost savings were calculable to the hundreds of thousands. An email from Dean Bertoline to all faculty and staff referenced some of the then immediate benefits and are part of the below list.

- ❑ The server infrastructure of the CoT was obsolete and required total replacement; ECN procedurally transitioned the CoT onto the CoE servers.
- ❑ The CoT had a total of 1.2 terabytes of archival-grade disk storage with no ability to expand and grow. Immediately after the merger, ECN increased the CoT server memory capacity to 20 terabytes, therefore relieving the constant pressure to delete infrequently used files. As well, previous solutions to buy external hard drives to supplement shortfalls in archival memory were lessened, reducing attendant cost and inefficiencies.
- ❑ CoT lacked consistent and coherent IT policies, procedures, practices and methodologies. After the merger, the entire set of these was made available to the CoT.
- ❑ IT staff were made available for consultation for purchases and support options for almost all versions of operating systems, including Mac support
- ❑ The antiquated ticket submission system was replaced with a new ECN ticketing system providing much more flexibility and making response times faster
- ❑ Prior to the merger over 60% of CoT faculty were connected at a PIC (Data) speed of “slow”. Through collaborative efforts with ITaP, ECN increased everyone within the CoT to a “medium” PIC speed at no additional cost. A PIC speed of slow to medium is a significant enhancement and provided a noticeable improvement in inter-/intranet access and retrieval speeds.
- ❑ Personnel were cross trained - so that the total number of available knowledgeable staff increased

### **Collaboration of ProEd and ProSTAR**

The College of Engineering’s Division of Engineering Professional Education (ProEd) and the College of Technology’s Center for Professional Studies in Technology and Applied Research (ProSTAR) share a common purpose, mission and vision. Underlying these is the fundamental premise that both serve the graduate educational needs of working adult professional learners in the STEM disciplines; this through credit and non-credit program offerings spanning the educational continuum of engineering and technology.

The preparation of engineers and technologists for the 21st century will be critically important to the prosperity of any nation. In this environment there is an opportunity for a university to redefine the relationship between engineering and technology and the preparation of graduates in their respective disciplines. This is potentially possible at Purdue University because of its high quality engineering and technology colleges. This is a significant tactical advantage that opens opportunities not available to many other universities.

Both organizations, ProEd and ProSTAR, recognize the similarities of their mission and shared purpose to provide learning opportunities to those in technical professions with careers in progress. To this end, and aside from common policies, procedures and practices, both organizations recognize the significant commonality premised on space (facilities, equipment), distance infrastructure (distance classrooms, capture and delivery mediums), and the engineering

– technology educational continuum (professional short courses, business/industry educational continuum needs). This richness in overlap creates an unquestionable synergistic opportunity for efficiency gains, cost savings and increased revenue through enrollments.

At this writing, both organizations are moving forward with co-location into the new Wang Hall. As postulated, synergies are already beginning to materialize into increased efficiencies and lower overall costs.

Appendix B provides additional detail on this collaborative enterprise-wide solution.

## Conclusion

The shared interests of the impacted cohorts; namely the central Information Technology organization and the many academic units are summarized below:

- ❑ Increase in operational efficiency
- ❑ Reduction in IT personnel costs
- ❑ Adequate response time from IT personnel

Additionally, there appears similar, although not necessarily shared in priority, the following interests:

- ❑ A common set of policies, procedures, guidelines and practices
- ❑ A consistent and coherent knowledge and skill base for each system (operating system, database management system...) and applications tool
- ❑ Promotion of career continuity and professional growth within the IT discipline
- ❑ Continued employment through the reassignment of human resources – this is accomplished through schedule level-loading across academic units

While control of resources is an identified position, it is not necessarily an interest of the academic units. To this end, control has not been identified as a driver or significant interest to be used as a consideration of model selection.

## Recommendations

Based on the results of this study, there are insights gained which provide valuable suggestions toward future success.

- ❑ Given the above shared interests, as well as similar interests, the organizational model most likely to satisfy both cohorts would appear to be a matrix model (refer above to personnel, efficiency, effectiveness and cost advantages of the matrix model).
- ❑ The centralization (matrix model) of information technology personnel will require a collective will and firmly executed decision authority on the part of Purdue's senior leadership. Supporting preferences takes away from our core mission. Basic change

management theory and practice would suggest a great deal of fear on the part of those most impacted will yield variable resistance.

- ❑ To successfully implement the suggested organizational model change, it is imperative we address and differentiate between operational and tactical objectives of the academic units. The operational objectives should focus on “what I need to do”, versus the “how to do it” focus of tactical objectives. The recommendation to move toward a matrix organizational model will satisfy the operational objectives of the bifurcated academic units, and satisfies the interests of both parties; without having to address the position or tactical interests of the academic units.
- ❑ The proposed matrix approach requires the establishment of “communities of practice” attendant to key hardware and software solutions. These many communities of practice will gain cross-academic unit knowledge and insight providing a synergistic effect toward servicing the operational interests of the academic units.
- ❑ Common computing hardware and software is not simply a practice used in business and industry, but one which will provide significant efficiency and effectiveness as well as cost savings to Purdue University and its academic units. To this end, it is recommended an initial area for an immediate enterprise solution is in the support function of information technology. These areas include, but are not limited to:
  - Common email
  - Desktop support
  - Server management
  - Networking services
  - Infrastructure related hardware and software
  - Course management
  - Undergraduate degree audit
  - And other enterprise hardware and software solutions

## **Areas for Further Research**

While the matrix organizational design model has both theoretical and practical evidence to support the shared interests of both cohorts, it is a recommendation of this committee that a cost pro forma be created reflecting the potential cost avoidance and/or savings from utilization of this model type.

Further, given there exists cost savings, versus simply cost avoidance, it is a further recommendation of this committee that a percent of that savings be returned to the academic unit for purposes of investing in additional faculty, continuing lecture lines or new graduate student positions.

Additionally, it is most important academic unit operational requirements versus tactical requirements be understood and uniquely addressed as part of the marketing of the proposed transformation to a matrix organizational model.



## Appendix A - Alternative Organizational Design Models

To better understand the type of organizational model currently employed by Purdue University Information Technology (IT) and the advantages and disadvantages of it, a greater understanding of heuristic or theoretical, models of organizational design is in order. What follows in this section is an overview of those models currently employed in business and industry, and, as envisioned by experts in academia. In practicality, nearly every organization uses a variant or permutation of one of the models discussed below. The current model employed by Purdue University's Information Technology (IT) is no different; this was discussed earlier in this report.

### Theoretical or Heuristic Models

Scholars and organizational leaders have devised many ways to partition an organization into subunits, with the intent of improving efficiency. Additionally, the intent of partitioning an organization is to decentralize authority, responsibility, and accountability. The mechanism through which partitioning is accomplished is called departmentalization. In all cases, the objective is to arrive at an orderly arrangement of interdependent components.

Many basic management courses refer to the three-variable formula below:

- $\text{Accountability} = \text{Authority} + \text{Responsibility}$

Authority is the power granted to individuals (possibly) by their position in the organization, so they can make decisions for other individuals to follow.

Responsibility is the obligation incurred by individuals in their roles in the formal organization in order to effectively perform assignments.

Accountability is being totally answerable for the satisfactory completion of a given assignment.

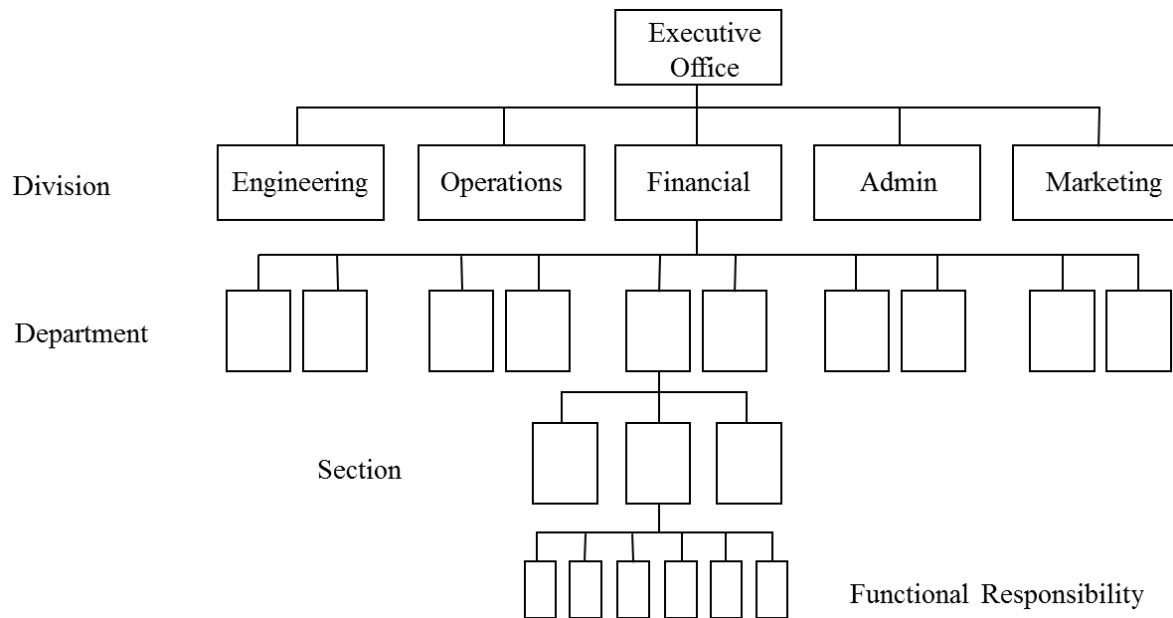
In the above formula, if you are given any two variables without the third, there is a high probability of some form of failure. Certainly, this seems most obvious when we are given responsibility and held accountable, but have no formal authority to execute. Likewise, authority and responsibility, without accountability, seems to promote subjectivity in decision making.

Organizational design models attempt to align these three variables to gain maximum efficiency and effectiveness for the organization. A direct effect of increased efficiency is a reduction in costs, frequently referred to as cost avoidance or cost savings.

### Traditional Design Model

In the traditional organizational structure, organizational units are based on distinct common specialties, such as engineering, manufacturing, information technology and finance. The figure below depicts an example of a traditional organization structure.





### Traditional Model Advantages

There are many advantages to the traditional (functional) structure. Below are listed some of the more pertinent ones:

- ❑ Easier budgeting and cost control is possible. This is true, for example, because all costs related to the above finance organization are rolled up to a single functional manager.
- ❑ Efficient use of collective experience and facilities.
- ❑ Institutional framework for planning and control. Under this type of organizational structure, planning as well as control is administered from a single functional stovepipe at the division level.
- ❑ All activities receive benefit from the most advanced technology. In this type of structure, great strength comes from focusing at the top the most state-of-the-art methodologies, technologies, and practices, and then disseminating these throughout all organizations utilizing functional resources.
- ❑ Allocates resources in anticipation of future business. When using a functional organization structure, the functional manager has responsibility for allocating resources based on immediate needs as well as future needs.
- ❑ Effective use of production elements.
- ❑ Career continuity and growth for personnel. Under a single functional umbrella, the functional manager can assure that all personnel under that umbrella receive like education and can assure that, for example, more senior personnel are assigned projects with increasingly greater responsibility or visibility, thus aiding in career opportunities and development.
- ❑ Well suited for mass production of items.
- ❑ Communication channels are vertical and well established.

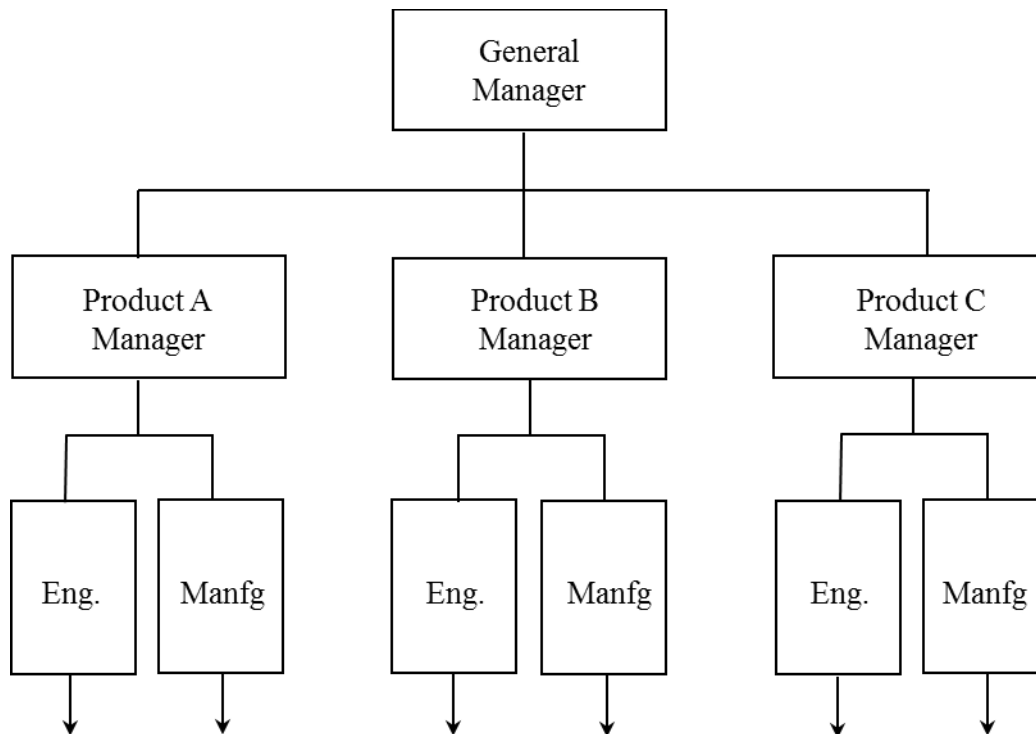
## Traditional Model Disadvantages

The traditional (functional) organization has many disadvantages as well. The more predominant disadvantages are:

- ❑ There is no central project authority. With this type of organizational structure, the many functions simply come together, usually centered on the type of program, and contribute to the accomplishment of the program's goals.
- ❑ Little or no project planning or reporting. Without a single program manager to be held accountable for the program's overall tasks, the functional managers simply concern themselves with their functional responsibility, therefore causing potential programmatic concerns.
- ❑ There exist a weak interface with the customer; no single focal point. While this may not always be true, the absence of a program manager may cause multiple interfaces through functional managers.
- ❑ Poor horizontal communication across disciplines/functions. Employees whose care and feeding comes from a functional stovepipe will generally take great care to nurture those individuals in that stovepipe who have supervisory control. Naturally, a stronger bond with functional management will occur over interfaces with horizontal functions.
- ❑ Difficult to integrate multidisciplinary tasks.
- ❑ Tendency of decisions to favor strongest functional group. This is true especially if the functional group is taking the lead on a given program.
- ❑ Response to customer needs is slow, primarily because functions are more concerned with functional activities than program activities.
- ❑ Ideas tend to be functionally oriented.
- ❑ Projects have a tendency to fall behind schedule. This stems from a lack of a single program manager tending to programmatic concerns.

## Product Design Model

In a product organizational structure, distinct operating units are organized around, and given responsibility for, a major product or product line. The figure below depicts a typical product-oriented structure. For purposes of this discussion, products could be loosely associated with academic units.



Product organizational structures are centered on major product or brand lines. For example, if an organization produced dish soaps, toothpaste, facial tissue, and so on, each might become a product structure and have its own product manager. Worth noting in the above is that other functions are replicated within each product organization. This is discussed further below.

### Product Model Advantages

- ❑ Strong control by a single product authority.
- ❑ Rapid reaction time. The product manager has all of the resources he or she needs to be successful, and can command these resources in any way required to satisfy the customer's changing needs.
- ❑ Encourages performance, schedule, and cost tradeoffs.
- ❑ Personnel are loyal to a single individual. Where that individual was the functional manager in the traditional structure, it is the product manager in this type of structure.
- ❑ Interfaces well with outside units. Here a single product manager is given primary responsibility for interfacing with other units, both externally and internally.
- ❑ Good interface with customer.
- ❑ Strong communication channels. It helps in this type of structure that all employees have a common goal: to produce a single product or brand of product. This builds a unified allegiance to a single cause.

### Product Model Disadvantages

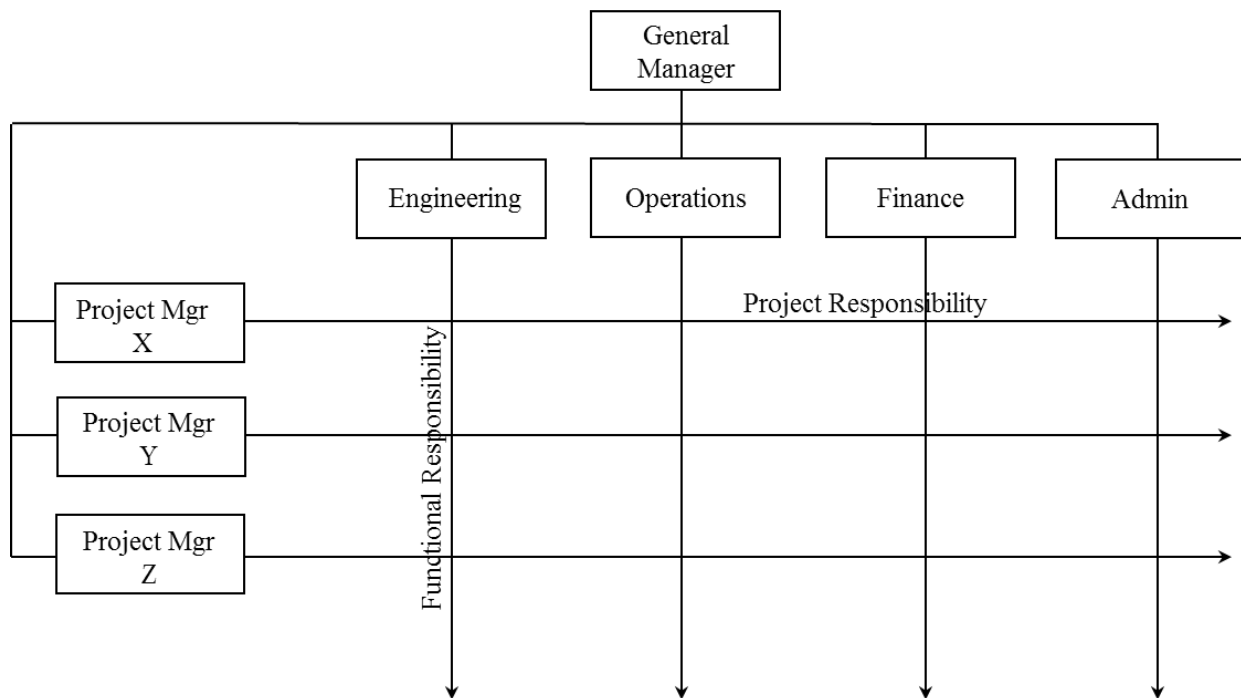
- ❑ Inefficient use of resources; duplication of effort. This may be the single greatest argument against this type of organizational structure. The fact that, in the above

example, engineering, finance, and so on are duplicated for every product line implies full-time employees are being used where part-time employees may only be required.

- ❑ Does not develop strong functional technology. Single individuals performing a single function on the product do not have the time or the breadth of exposure to see what the latest and greatest methodologies, techniques, and practices may be.
- ❑ Does not prepare for future business. Without functional oversight, the entire product organization is focused on design, development, and delivery of a single product or brand. If greater vision does exist, it typically is limited to similar, or like, products.
- ❑ Less opportunity for technical interchange among projects.
- ❑ Minimal career opportunity and continuity for project personnel. In other words, there may be limited growth potential.
- ❑ Difficulty in balancing workloads as projects phase in and out. Individuals may not have work in a particular time frame, but must be kept busy doing something until that specific type of function is again in demand.

### Matrix Design Model

The matrix structure is a hybrid organization that attempts to balance the use of human resources as people are shifted from one project to another. It can be viewed as a project organization superimposed over a functional organization. The figure below is an example of a typical matrix organizational structure.



The matrix structure is more complex than either the traditional or product-oriented structures. To this end, it requires some basic ground rules to be successful:

- ❑ Participants must spend committed time on a project; this ensures a degree of loyalty.
- ❑ Horizontal as well as vertical channels must exist for making decisions.
- ❑ There must be quick and effective methods for conflict resolutions.
- ❑ There must be good communication channels between managers.
- ❑ All managers must have input into the planning process.
- ❑ Both horizontal and vertical managers must be willing to negotiate for resources.
- ❑ Horizontal line must be willing to operate as a separate entity except for administrative purposes.

Project management is more behavioral than quantitative. Interpersonal and communicative skills are extremely important attributes of the project manager.

In a matrix organizational structure:

- ❑ There should, ideally, be no disruption due to dual accountability.
- ❑ A difference in functional management judgment should not delay work in progress.

### **Matrix Model Advantages**

Advantages of the matrix organizational structure are:

- ❑ Combines the strengths of both product and functional organizations.
- ❑ Provides a good interface with the outside customer.
- ❑ Promotes effective interdisciplinary task integration.
- ❑ Promotes an efficient use of production resources.
- ❑ Promotes effective project control, as programmatic concerns are assigned to a single individual.
- ❑ Promotes career continuity and professional growth, as each functional individual has a home after project completion.
- ❑ Perpetuates technology. By this, functional resources gain the benefit of a functional strength, which can be transferred to the program of the day.
- ❑ Functional knowledge is available for all projects on an equal basis.

### **Matrix Model Disadvantages**

Disadvantages of the matrix organizational structure include:

- ❑ Dual accountability of personnel. This is perhaps the biggest threat to this type of structure. Personnel will generally favor whoever it is that completes their performance review and subsequently has control over their income adjustments. Confusion here can derail a unified effort.
- ❑ Conflicts between project and functional managers. This issue will be discussed in more detail below.
- ❑ Profit and loss accountability is more difficult.

- ❑ There are continuously changing priorities, especially on the part of the functional managers, who control the resources.
- ❑ The balance of power between functional and project managers must be watched.
- ❑ Functional managers might be biased toward their own priorities.
- ❑ Because of the duality of authority, employees may not feel a strong commitment to a single source.
- ❑ Employees may feel confused about loyalty.

Project managers have different concerns than do functional managers. A project manager is concerned with:

- ❑ What is to be done?
- ❑ When will the task be done?
- ❑ What is the importance of the task?
- ❑ How much money is available to do the task?
- ❑ How well has the total project been done?

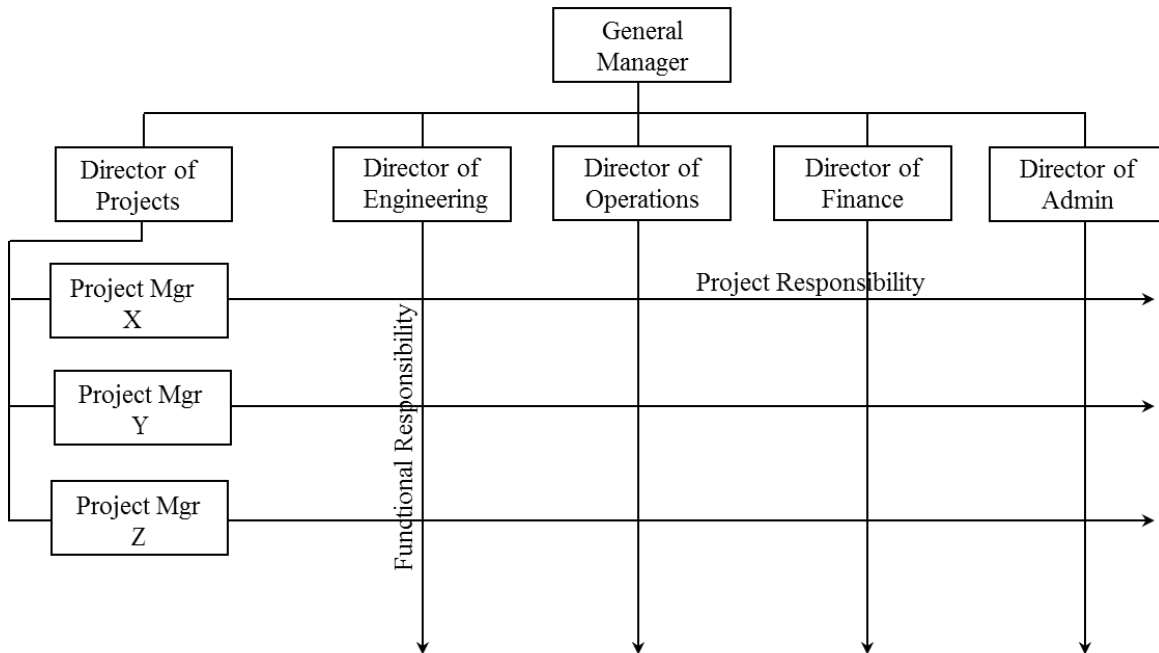
The functional manager has a more hands-on concern, as listed below.

- ❑ How will the task be done?
- ❑ Where will the task be done?
- ❑ Who will do the task?
- ❑ How well has the functional input been integrated into the project?

### **Project Management Design Model**

The project management structure attempts to further organize the project/functional (matrix) structure by providing a single point of authority, responsibility, and accountability for all projects, in much the same manner as a functional manager.

The figure below depicts the typical project management structure.



The advantages and disadvantages of this form of organizational structure are as follows.

### Project Management Model Advantages

- ❑ Better overall control of projects. A single director of projects can work with the numerous project managers to ensure uniformity in execution.
- ❑ More consistent customer relations.
- ❑ Better overall project visibility. The director of projects can ensure that all programs report the same information in the same manner.
- ❑ Improved coordination among company divisions.
- ❑ Accelerated development of managers due to breadth of project responsibility.

### Project Management Model Disadvantages

- ❑ May be too much shifting of personnel from one project to another.
- ❑ May be potential conflict with functional managers. The conflict should be less between the individual functional managers and the director of projects than between the individual functional managers and the individual program managers.
- ❑ Functional managers may resist taking direction from a director of projects because to do so would imply an admission that the project manager might be next in line to the division manager.

### Criteria for Selecting an Organizational Structure

When looking at the reasons why an organization might select one form of organization versus another, three points are applicable.

- ❑ Technology—Functional organizations tend to have greater process and technology focuses.
- ❑ Communications—Traditional and product organizational structures tend to provide clearer communication paths.
- ❑ Responsibility—Product structures very clearly identify the responsible party; matrix structures are not as clear.

## Summary Remarks

Summarizing:

- ❑ No single structure is optimal for all organizations.
- ❑ Organizational structure may, and will, change to meet changing requirements.
- ❑ There is no such thing as a good or bad organizational structure; there are only appropriate and inappropriate ones based on the organization's end objectives.
- ❑ The organizational model employed is second, and should be fitted to the overall objectives of the university/company; e.g., a focus on efficiency for cost savings purposes would lend itself to a traditional functional model or a matrix organizational model.
- ❑ The model suggestion in this report will result in increased efficiency, improved effectiveness, reduction in duplication of resources, decreased costs and real cost savings.



## **Appendix B – CoE/CoT Distance Education Collaboration Whitepaper**

The following is an excerpt of a whitepaper co-published by Dale Harris and Mitch Springer on January 17, 2013, titled *College of Technology/College of Engineering Distance Education Collaboration*.

### **Overview**

While it is widely accepted the sharing of resources creates efficiency and subsequently lowers overall costs, the premise of this white paper is solidly grounded in organizational design theory and practice. ProEd and ProSTAR, through collaboration, anticipate organizational cost avoidance and increased gross revenue through more efficient utilization of space, distance infrastructure and the engineering-technology educational continuum; therefore yielding increased net residual to the university, colleges, departments and faculty.

Nearly 14 months ago our two colleges opened discussions on collaboration. The manifestation of these many earlier discussions culminated in a more focused and targeted series of meetings to determine areas for collaboration and how that collaboration might look. Primary areas for collaboration, a result of these many meetings, centers on space, distance infrastructure and the engineering-technology educational continuum.

### **Collaboration will Decrease Total Costs**

A decrease in total costs will manifest from the sharing of space and distance infrastructure. In particular, ProEd uses instructional space during the regular instructional hours; whereas ProSTAR often makes use of equivalent instructional space in the evenings and on weekends. Both organizations have expanding space needs and collaboration will yield obvious efficiencies. Distance infrastructure (course development and production) is yet another area for significant cost savings. ProSTAR can capitalize on ProEd's expertise and long standing and proven success in this area. Collaboration will increase the efficiency of space usage and will add economies of scale for staff and technology infrastructure.

### **Potential for Increased Scale and Revenue**

It is important to recognize that while Purdue views engineering and technology as separate “disciplines”, corporate employers often draw a fainter line between the two. This is particularly true when planning and developing professional development opportunities for their technical staff. Thus, collaboration will create an increase in revenue from multiple opportunities; designing, developing and delivering professional non-traditional, industry-specific degree, non-degree and certificate oriented programs. Collaboration will provide a better understanding of the theory to practice curriculum continuum we offer to our working adult professional learners. Understanding the curriculum continuum in business and industry is critical to providing a targeted and relevant course delivery to adult professional learners pursuing a graduate degree or credentialing through our professional studies administrative organizations.

## **Previous Successful Collaborations**

ProEd and ProSTAR, aside from targeting the same type of student; the working adult professional learner, have an underlying urgency for continued success, namely, both organizations are entirely self-supported. Neither ProEd nor ProSTAR receive State or University funds for on-going concern support. The continuation of both organizations is entirely premised on the success in satisfying the professional and personal needs of business/industry and our students. Given this, ProEd and ProSTAR recognize the need to collaborate, and have worked together in numerous previous capacities.

As well, the colleges of Engineering and Technology have formed many other successful collaborative relationships from curriculum development and delivery to the highly recognized IN-MaC and the Innovation Design Center. This proposed collaboration is yet a continuation of these many and growing collaborative initiatives and activities.

## **Future Possibilities for Collaboration**

It is thought that collaboration on space, course production and delivery, and short course development are the most straightforward areas for collaboration in that there is little identifiable downside. Collaborations on marketing and student services would be much more complex and potentially disruptive. Thus they will not be pursued initially. However, collaboration in these areas will remain as possibilities for the future.