IT operations:
Making IT work in a profoundly heterogeneous environment

(http://www.esp.org/rjr/briite-RJR-MDA-05.pdf)

Robert J. Robbins

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(206) 667 4778

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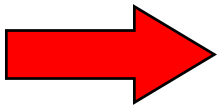
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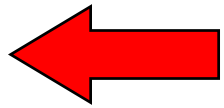

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Simple Fact

In the post-genomic world, it is not possible to do significant bio-medical research without adequate information infrastructure.

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Quality IT operations are now critically important to the **mission** of biomedical research organizations.

Topics

- To deliver quality IT operations, we must
  - overcome the past
  - embrace the future
  - strive for constant improvement

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  - overcome the past
  - embrace the future
  - strive for constant improvement
- Understanding research needs:
  - business model
  - operational practices
  - cultural norms

Past History

Past History

- IT deployment by historical accidents
- IT as a management tool, not a scientific one
- IT as a scientific utility, not a critical need
- IT as an expense, not a strategic asset

Future Challenges

- Overcoming historical accidents
- Recognizing the “critical need” for IT
- Implementing IT as a strategic asset
- Dealing with profoundly heterogeneous needs

Improving IT Operations

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Benchmarking

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But how to define a “peer” and what to benchmark?

To define a “peer”, we first need to understand our own organization.

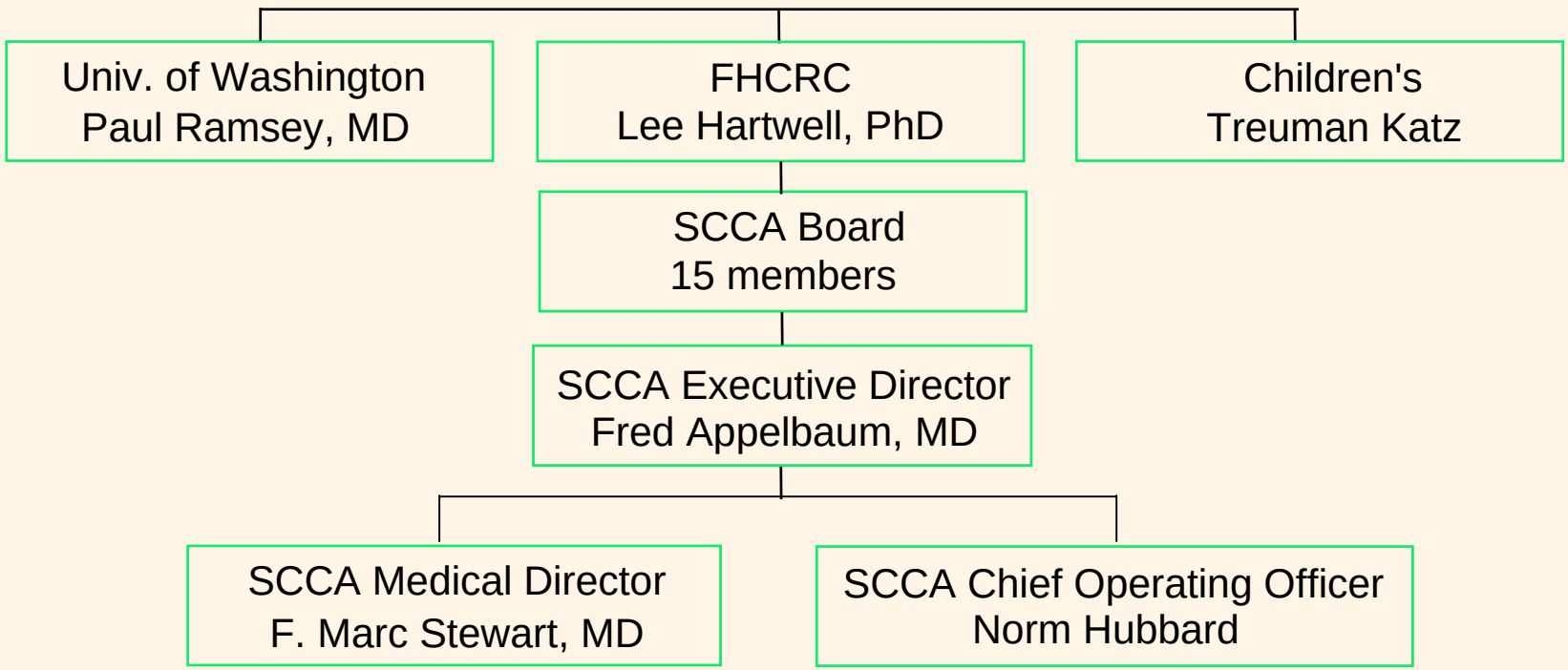
Aside

Who are we?

What is the FHCRC?

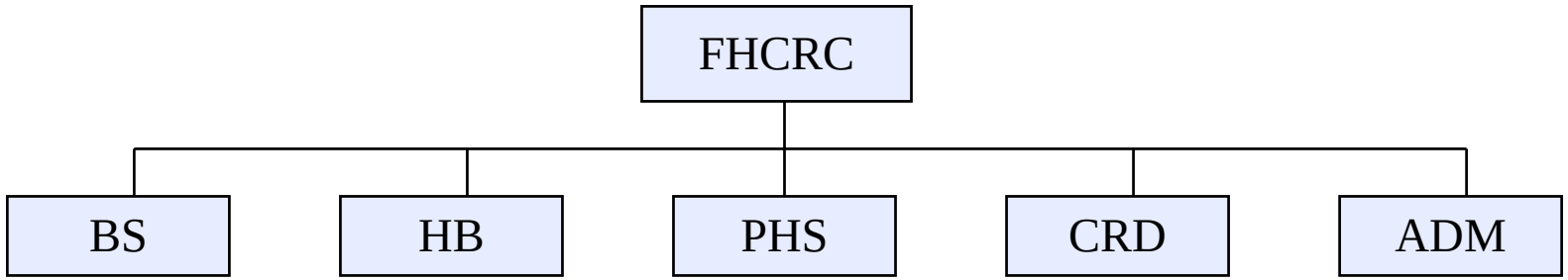
- **Independent research organization**: Funded almost entirely by grants, organized like a collection of university departments, no health-care operations.
- **Seattle Cancer Care Alliance**: A major cancer treatment facility consisting of the oncology patient-care programs of three institutions: FHCRC, University of Washington, and Children's Hospital.
- **Comprehensive Cancer Center (with CCSG)**: An extended, multi-institution cancer center, consisting of the oncology-research programs of three institutions: FHCRC, University of Washington, and Children's Hospital.

SCCA Structure



- ***501 (C)(3) organization***

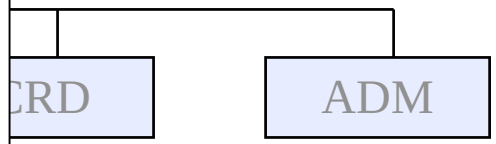
FHCRC IT Staffing



BS	HB	PHS	CRD	ADM
2 Div Support		4 PHS Div Comp	11 Clin Computing	60 Info Tech
1 Henikoff Lab	1 McDougall Lab	18 SCHARP	3 Geraghty Lab	6 Development IS
	1 Reid Lab	15 SWOG		6 Shared Res
	1 Nelson Lab	14 CPRP		3 Human Resources
		11 WHI		
		11 Epi / CSS		
		8 COMPASS		
		7 CDS		
		3 Biostatistics		
		3 Wilms Tumor		
		2 Smoking Prev		
		1 Radiation Research		
		1 Quant Genet		

FHCRC IT Staffing

As an independent research organization, FHCRC employs more than 200 IT professionals, organized into more than 25 (independent) units.



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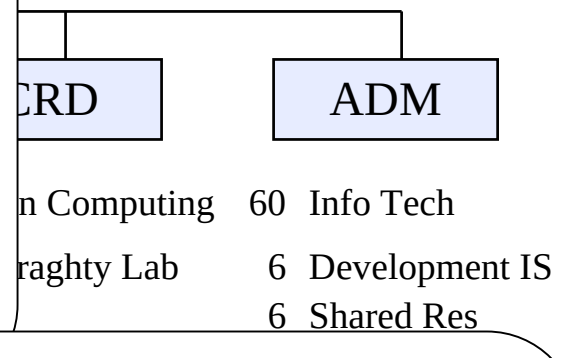
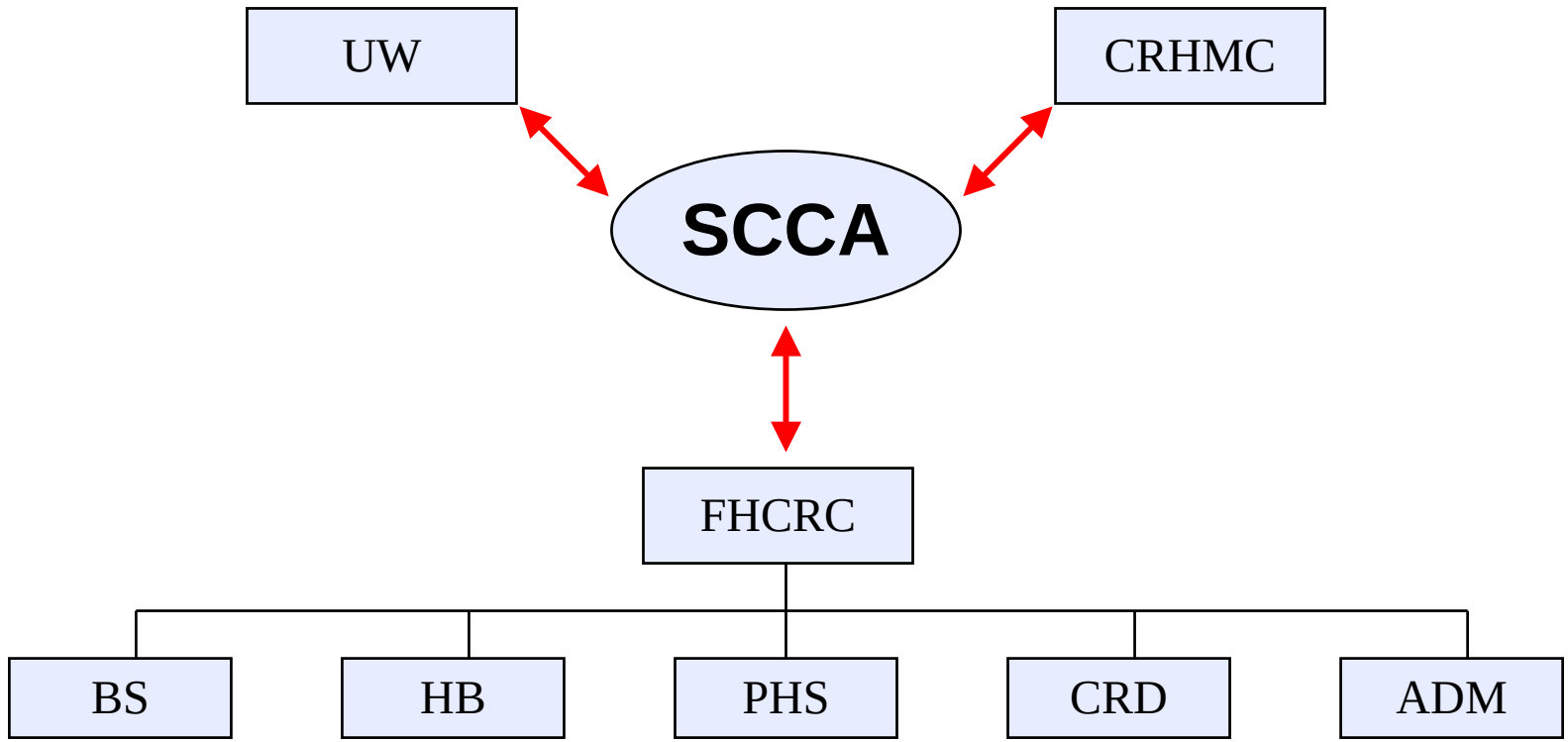


When you consider the IT operations of the SCCA, this simple model gets much more complicated…

FHCRC IT Staffing



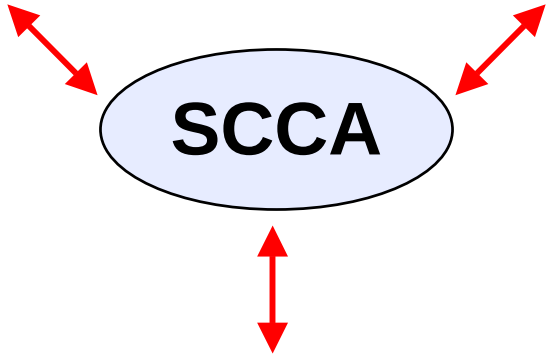
SCCA IT Support

UW

Electronic Pt Record (MINDscape ORCApowerchart)
Radiology (PACS, IDX Rad)
Nursing (CIS)
Medical Records (ChartFlow)
Scheduling/Registration (Cadence, Prelude)
Surgical Scheduling (ESI OR)
Lab System (Mysis)
UW Inpatient Notes (CIS)
Pathology Registration (PACs, PowerPath)
Pharmacy (ACIS. Medteach, Cerner PharmNet)
Finance (PFS)
Billing (ARE, ePremis, PFS, Epic Resolute)
Radiation Oncology (Prism)
Radiation Scheduling (IDX-Rad)
Chart Requests (Cerner Chart Tracking)
Material Management (ESI)

CHRMC

Finance/Registration (InVision)
Nursing (CIS)
Lab (Cerner)



FHCRC

Clinical Research Data Access (BridgIT,)
Protocol Daily Reports (Clinical FYI)
HR/Finance (Peoplesoft)
Protocol Review (eReview)
FHCRC/SCCA Labs (Labvision)
Desktop Support
Server Operations
Email
Voice/Data Operations

Aside

Who is a peer?

Structural IT Drivers

	CIS	ESS	VDO
FHCRC:	NO	YES	YES
UWMC:			
City of Hope:			
MSK:			
Dana Farber:			
MD Anderson:			
JHU (Kimmel):			
UCSF (CC):			

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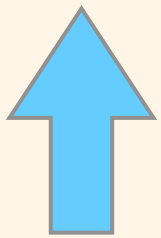

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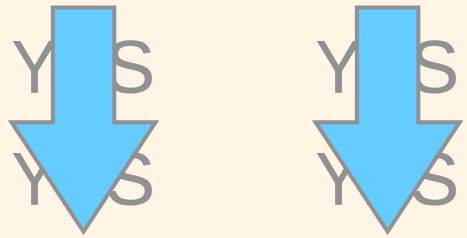

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JHU (Kinmel):	NO	NO	NO
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OK – No peers.

Now what?

Improving IT Operations

Industry Standards

Information-Intensive Business

One can barely begin to read a current journal without finding a reference to the fact that biomedical research has become an information-intensive field.

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Maybe we should look to information-intensive fields for operational ideas…

Reality Check I

Which is likely to be more complex?

- identifying, documenting, and tracking the whereabouts of all parcels in transit in the UPS system at one time

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- identifying, documenting, and tracking the whereabouts of all parcels in transit in the UPS system at one time
- identifying, documenting, and tracking all data, all materials, and all equipment relevant to all aspects of all publicly funded biomedical research, in all fields and on all topics.

Reality Check I

Five years ago, United Parcel Service:

- used redundant multi-terabyte databases to track all packages in transit
- had 4,000 full-time employees dedicated to IT
- spent one billion dollars per year on IT
- had an income of 1.1 billion dollars, against revenues of 22.4 billion dollars

Reality Check I

Company	Revenues	IT Budget	Pct
Chase-Manhattan	16,431,000,000	1,800,000,000	10.95 %
AMR Corporation	17,753,000,000	1,368,000,000	7.71 %
Nation's Bank	17,509,000,000	1,130,000,000	6.45 %
Sprint	14,235,000,000	873,000,000	6.13 %
IBM	75,947,000,000	4,400,000,000	5.79 %
MCI	18,500,000,000	1,000,000,000	5.41 %
Microsoft	11,360,000,000	510,000,000	4.49 %
United Parcel	22,400,000,000	1,000,000,000	4.46 %
Bristol-Myers Squibb	15,065,000,000	440,000,000	2.92 %
Pfizer	11,306,000,000	300,000,000	2.65 %
Pacific Gas & Electric	10,000,000,000	250,000,000	2.50 %
Wal-Mart	104,859,000,000	550,000,000	0.52 %
K-Mart	31,437,000,000	130,000,000	0.41 %

Reality Check II

One biotech company, Celera, spent more money on IT in its first year of business than all of NCI has spent on IT in the last five years.

Reality Check III

Resource Availability

- Compared to the recent past, current government spending on biomedical information infrastructure is huge.

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- Compared to the recent past, current government spending on biomedical information infrastructure is huge.
- Compared to what's needed, current government spending on biomedical information infrastructure is tiny.

Reality Check III

Appropriate overall funding level:

- approx. 5-15% of total public-sector biomedical research funding

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Seem high?

What percent of enterprise operating budgets goes to IT in those industries where IT makes a strategic difference?

Reality Check III

Appropriate overall funding level:

Warning:

Until more resources become available, finding true SOLUTIONS to biomedical research-IT problems will be impossible.

to IT in those industries where IT makes a strategic difference?

Improving IT Operations

Alignment

Achieving Buzzword Compliance

A Google search on

"align | aligning IT | technology"

with

"business goals | objectives | strategies | needs"

to achieve competitive

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Most of them selling something…

Achieving Buzzword Compliance

So, one achieves operational nirvana by aligning IT with something…

But in a research organization, with what aspect of research do we align?

Achieving Buzzword Compliance

So, one achieves operational nirvana by aligning IT with something…

But in a research organization, with what aspect of research do we align?

Getting grants

Doing research

Publishing papers

Training students… **or…**

Understanding Research

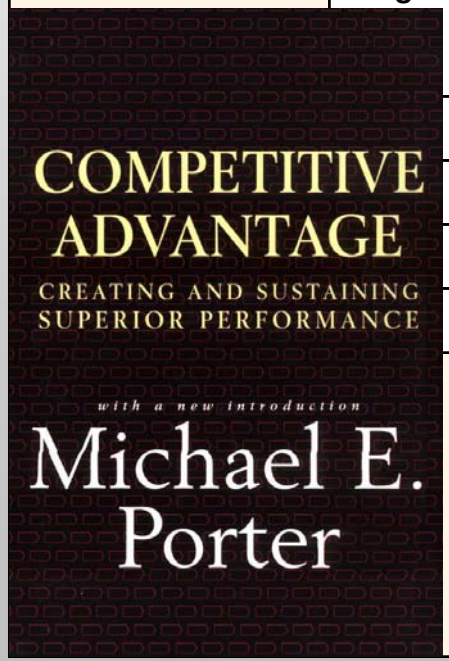
Understanding Research

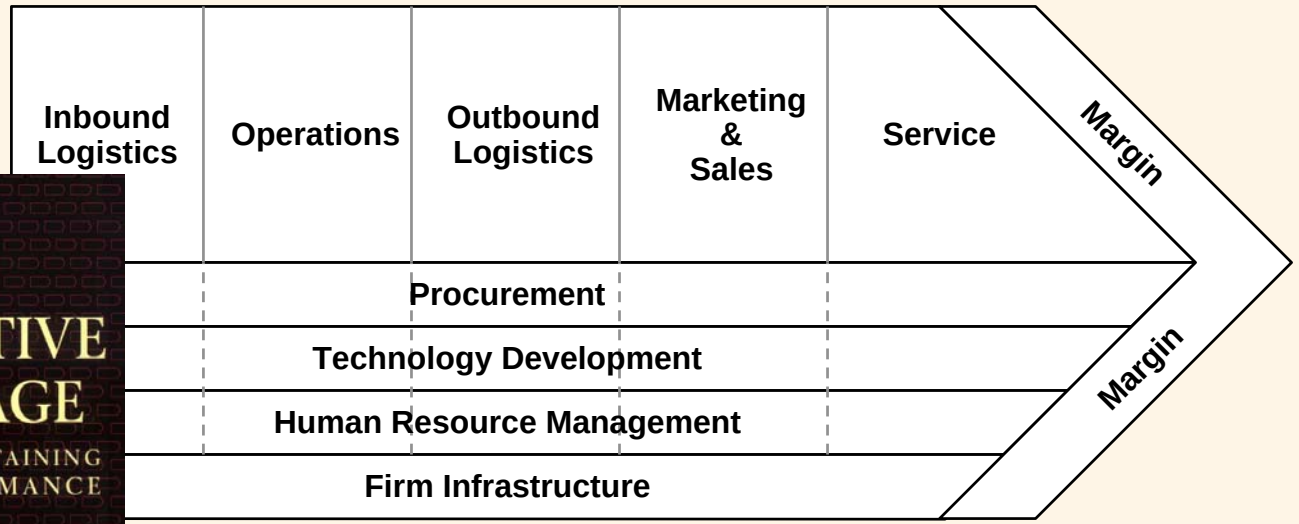
Business Model

Michael Porter Value-Chain Analysis

The Value Chain: *Commerce*

Michael Porter's works on competitive advantage contain a compelling analysis of the various components of operational activities in a competitive enterprise.

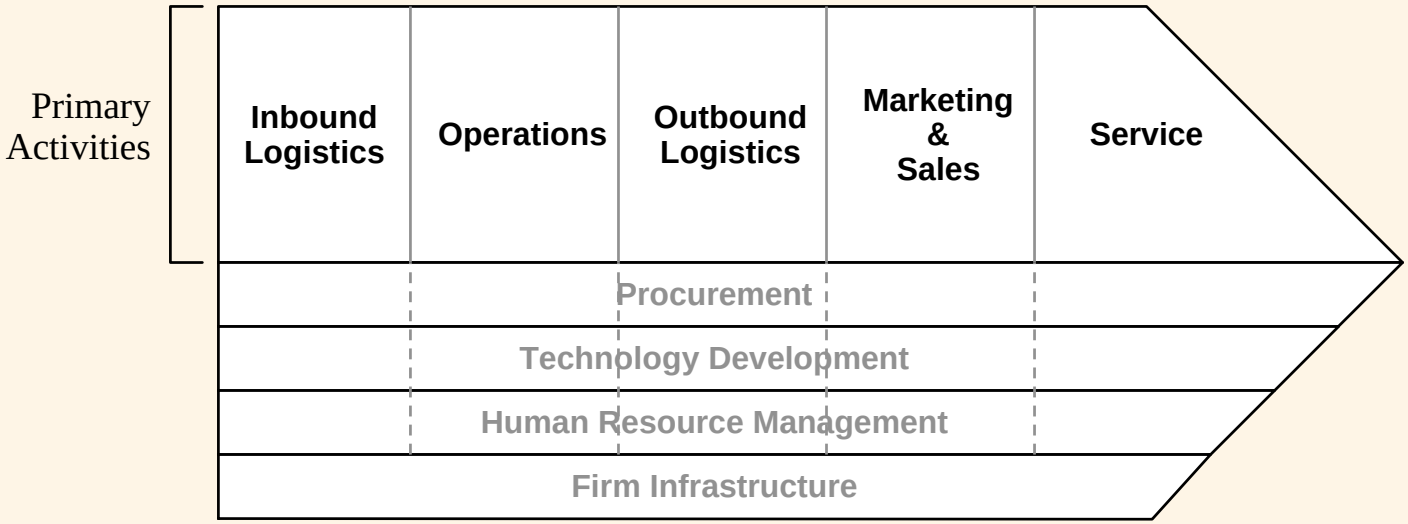




Michael Porter. 1985. *Competitive Advantage*.

The Value Chain: *Commerce*

According to Porter, the value-adding **primary activities** of the enterprise define the enterprise. Primary activities must be managed to deliver maximum strategic competitive advantage.



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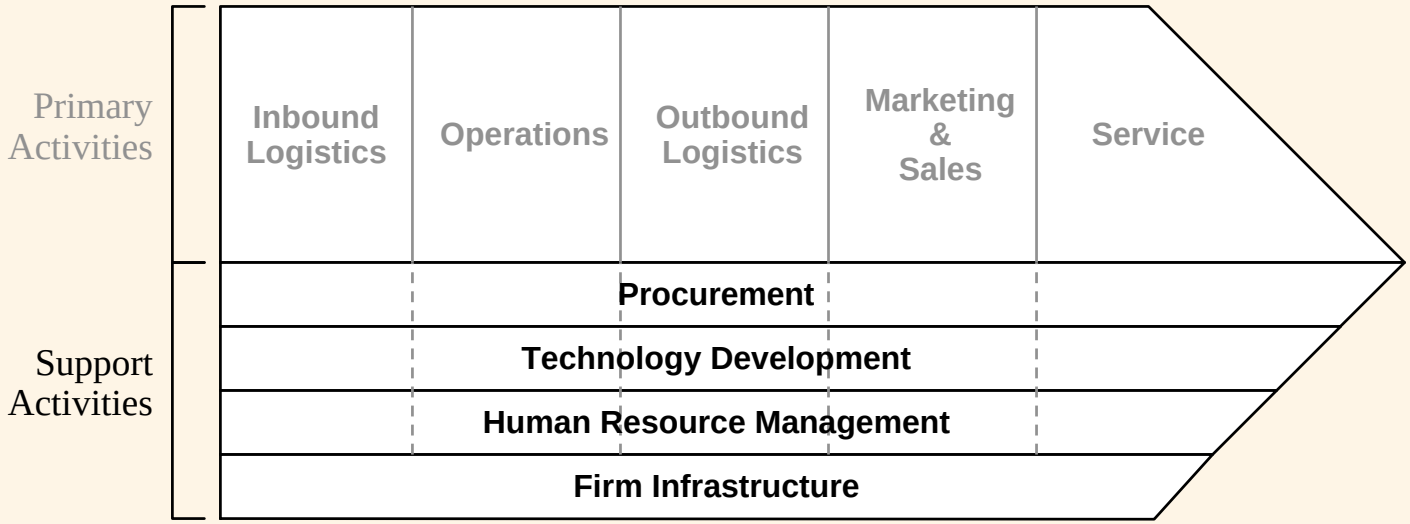
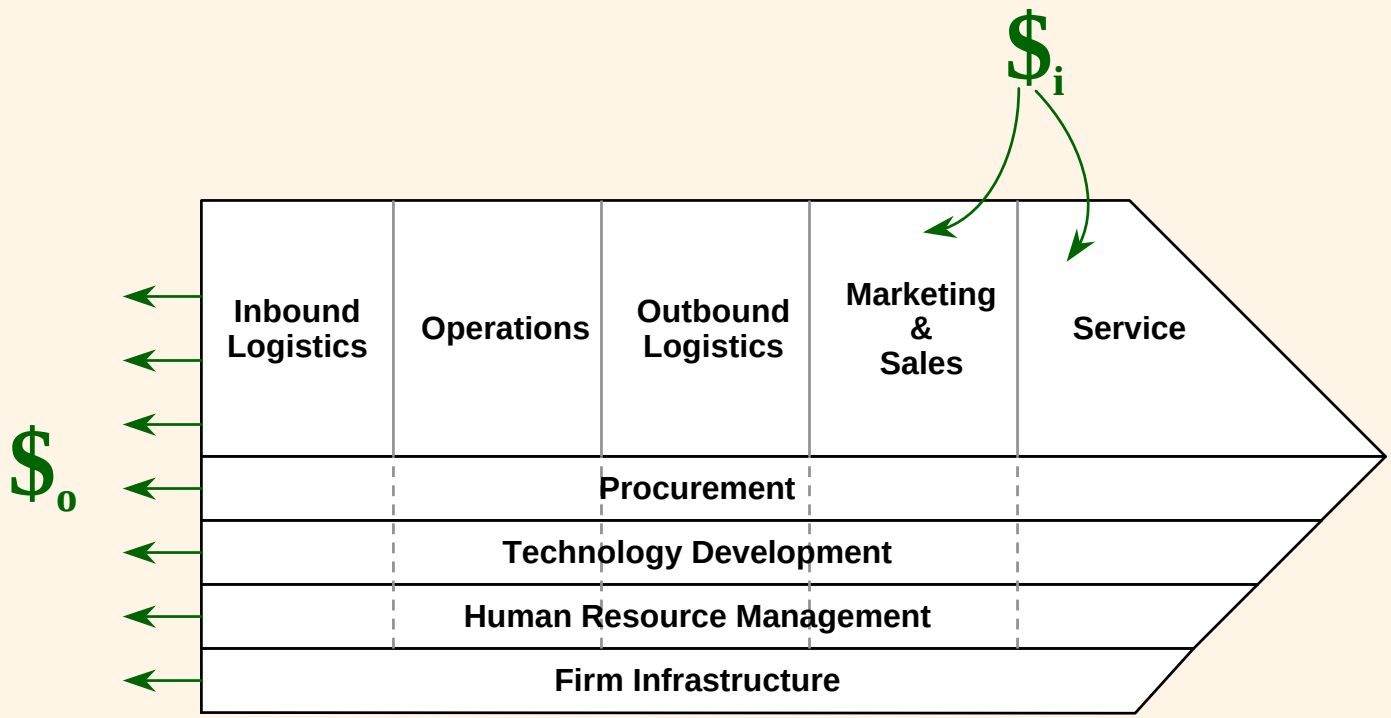


Conversely, **support activities** are necessary but not sufficient for the success of the enterprise. Support activities must be managed for maximum cost-effectiveness.

The Value Chain: *Commerce*



Cash outflow $\$_o$ occurs during the value-adding and support processes. Cash inflow $\$_i$ occurs when the value-added products are sold to customers.

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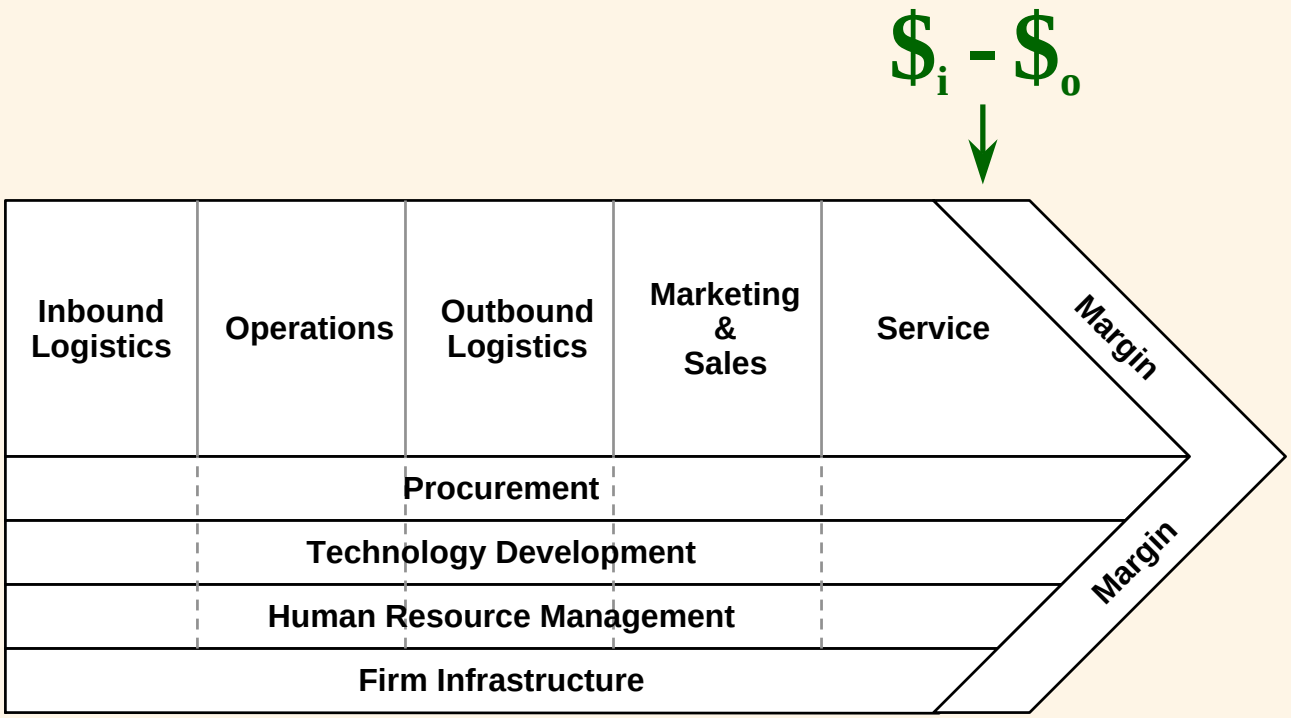
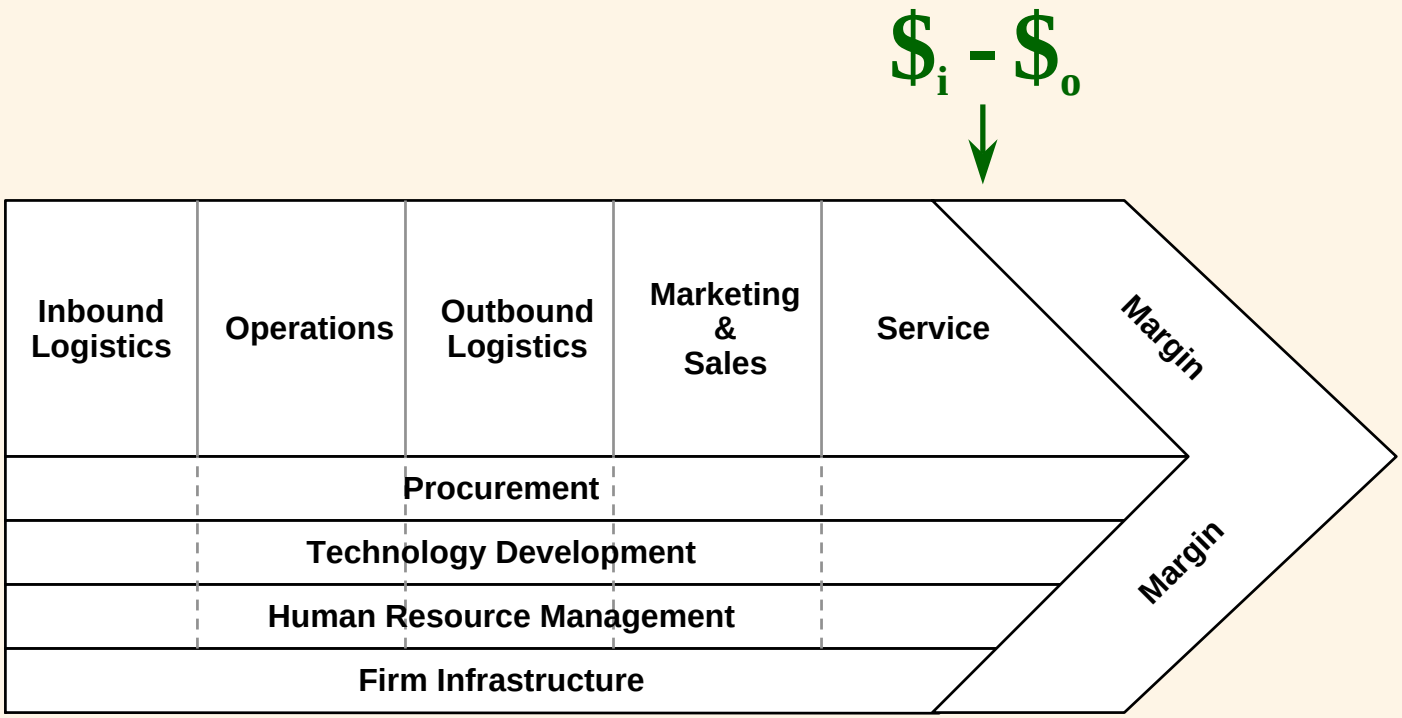


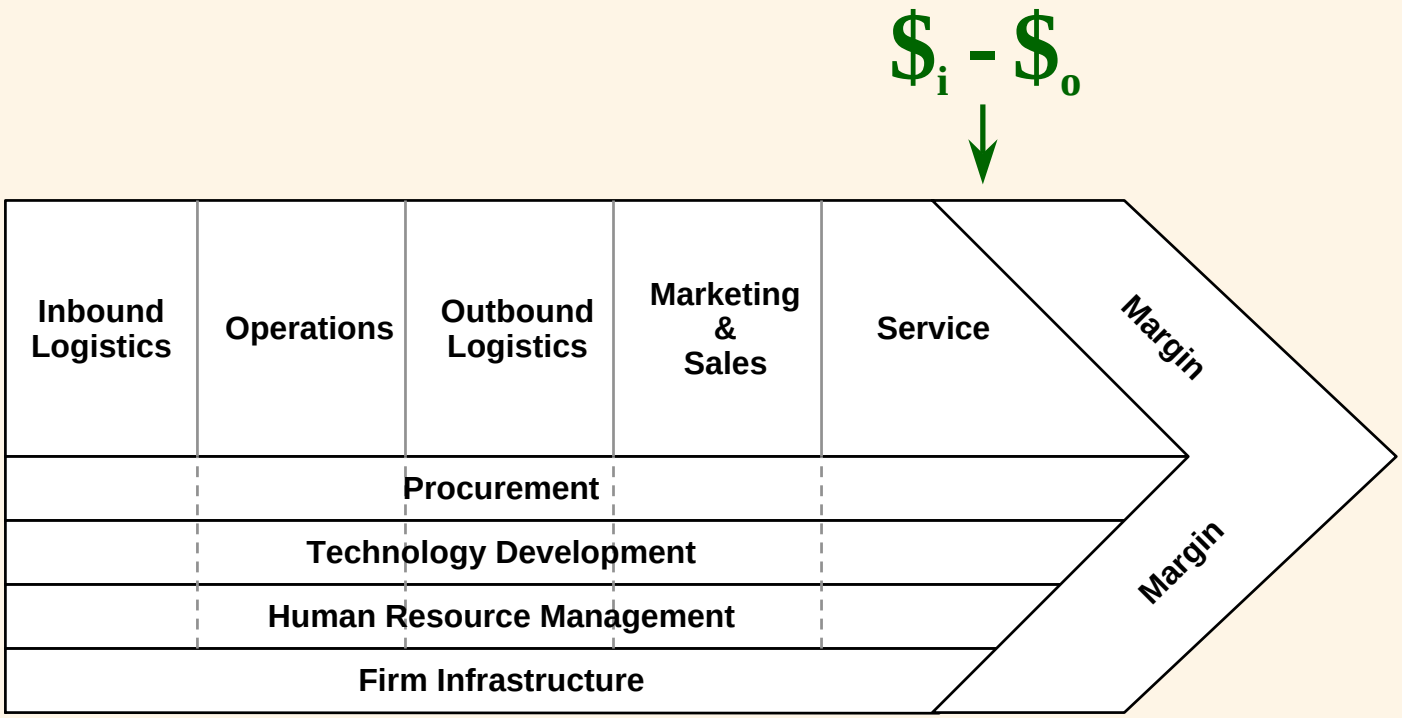
Simplistically speaking, the difference between cash inflow and outflow ($\$_i$ - $\$_o$) provides the margin of profit.

The Value Chain: *Commerce*



Increased expenses (strategic investment) can lead to increased profits, if the expenses generate more value than they cost.

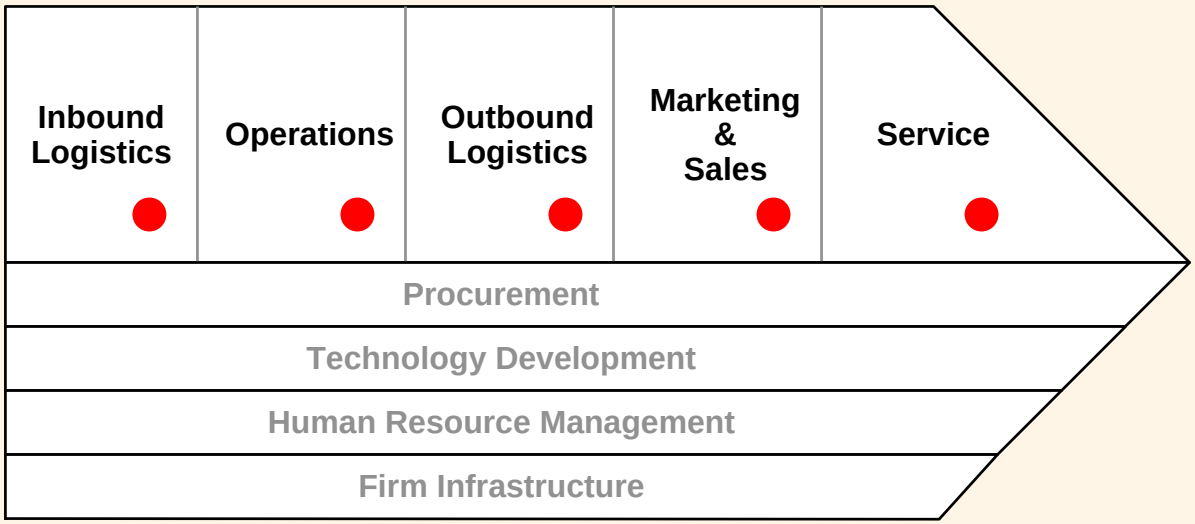
The Value Chain: *Commerce*



Note: Because $\$_o$ usually occurs before $\$_i$, we can judge the appropriateness of cost-incurring activities to the extent that we can measure the effect of a particular $\$_o$ upon overall $\$_i$.

The Value Chain: *Commerce*

As highly plastic tools, computers can play useful roles in both the accomplishment and the management of tasks. Thus, computers have potential roles in all phases of the value chain.



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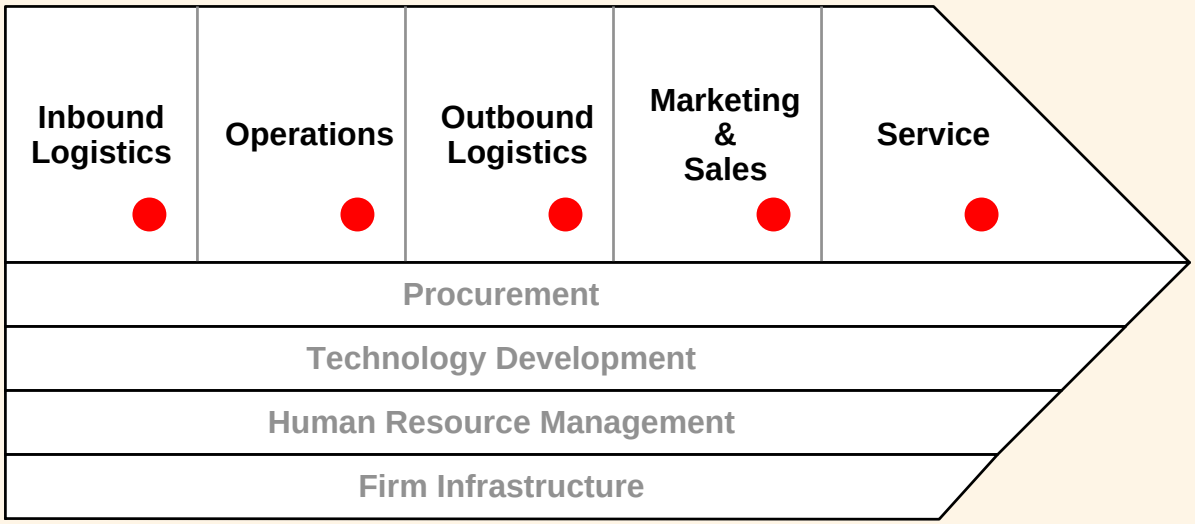
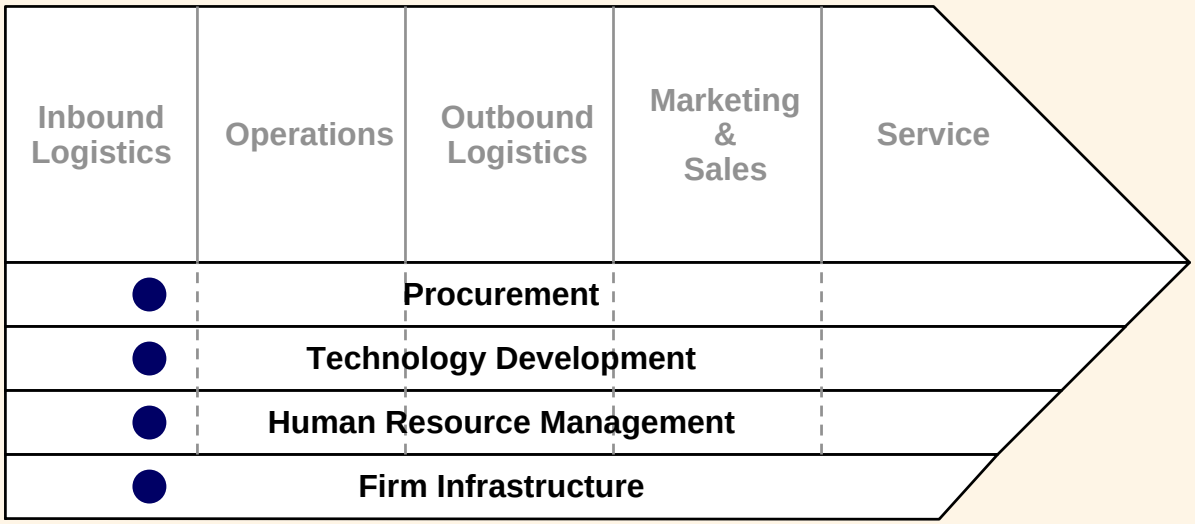


Many of the most successful companies of the last fifteen years have achieved that success through the skilled deployment of IT to great competitive advantage.

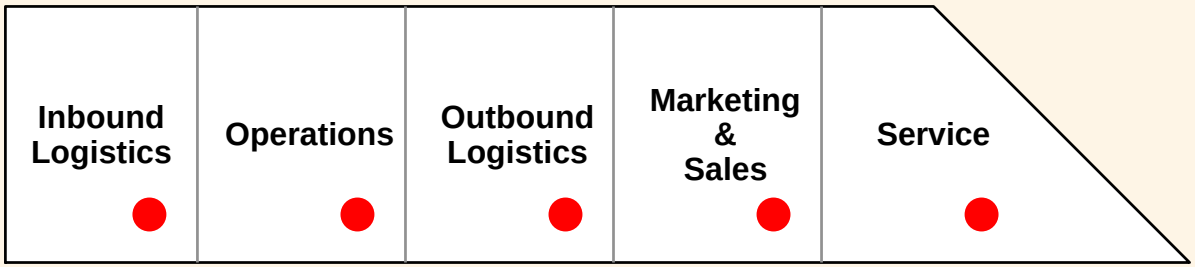
The Value Chain: *Commerce*



Computers can also play useful roles in many support activities. Here, IT delivers infrastructure strength and may contribute to competitive advantage through cost containment.

The Value Chain: *Commerce*

In the value-adding chain, IT is a strategic asset and must be managed accordingly. Investment is made to maximize strategic competitive **effectiveness**.



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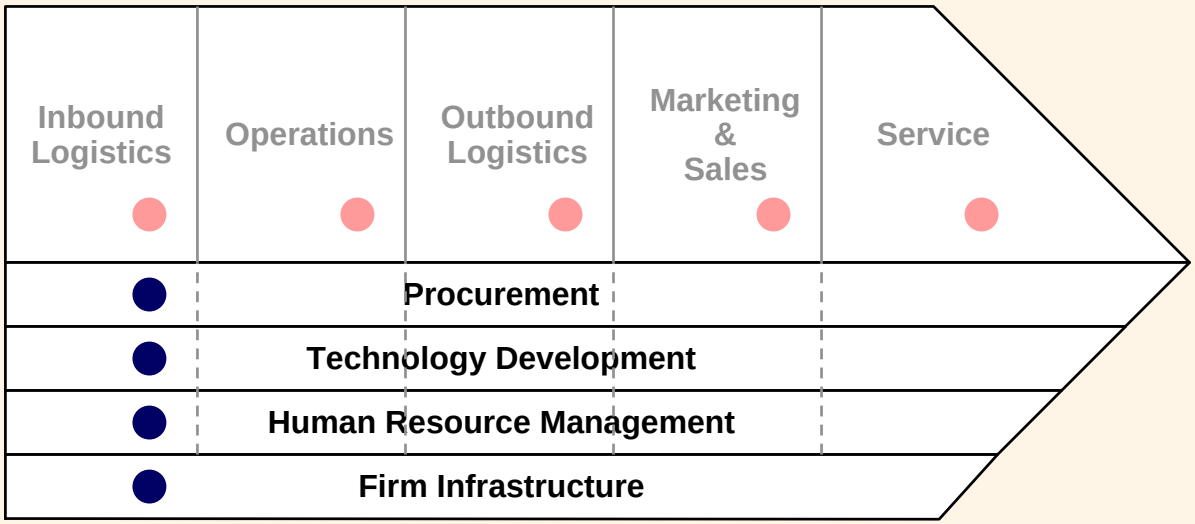
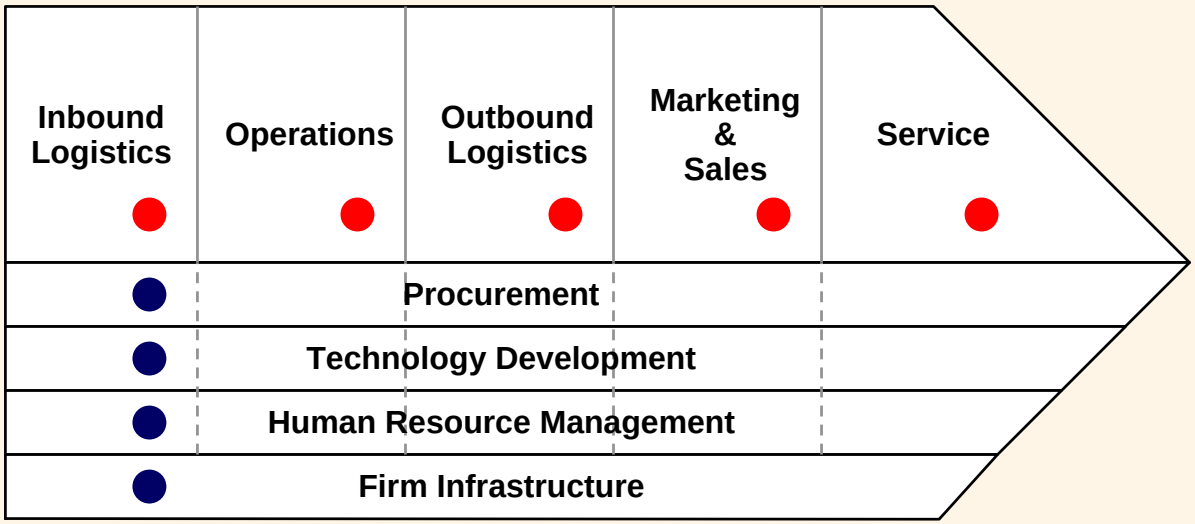


In support activities, IT is a cost-center component and must be managed accordingly. Costs must be contained and the entire operation tuned to achieve maximum operational **efficiency**.

The Value Chain: *Commerce*

The rapid rate of technological change adds another complexity.



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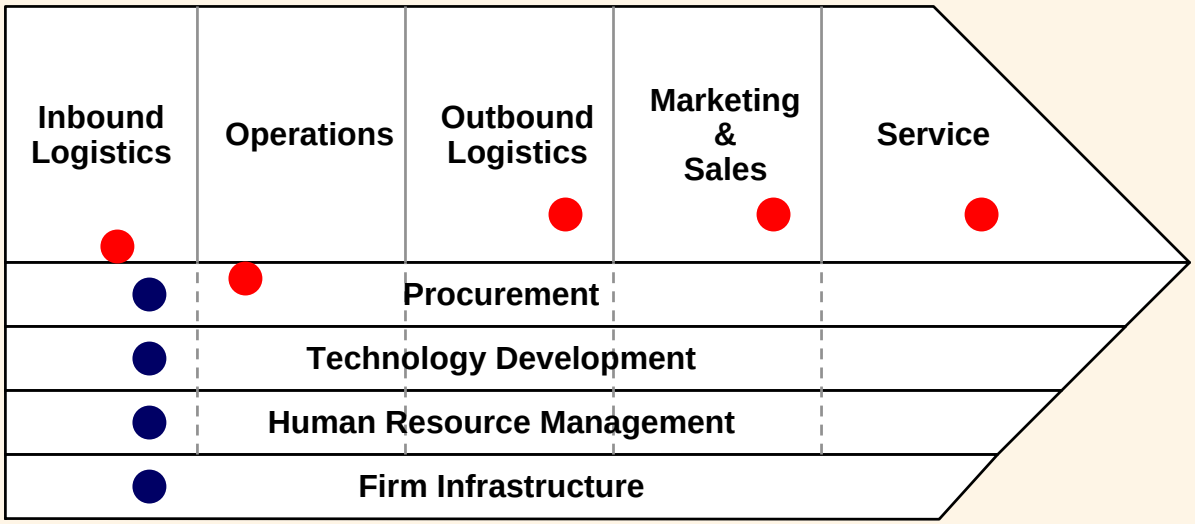

Value-adding activities can become support activities overnight.

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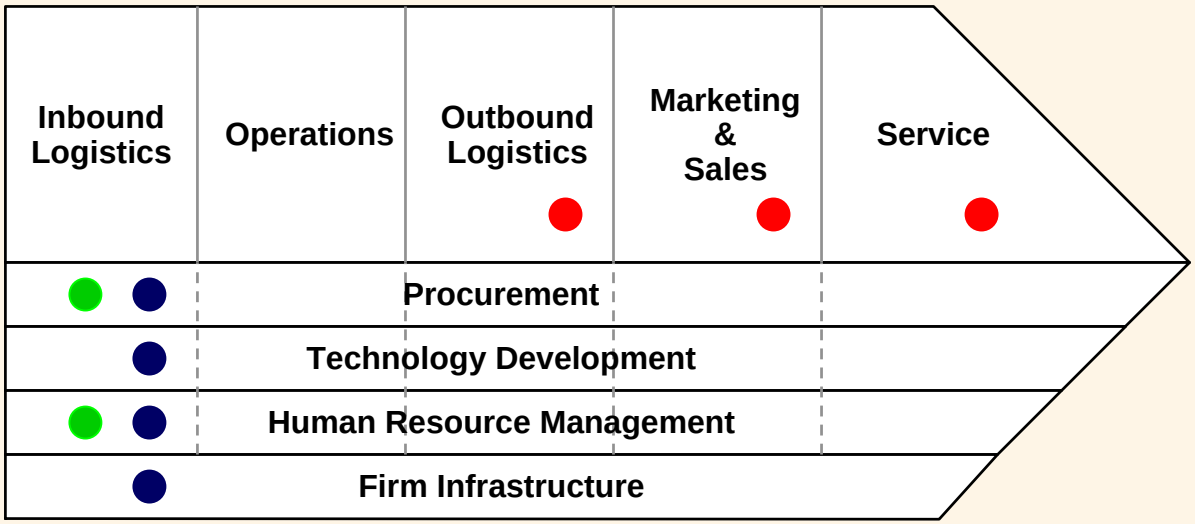

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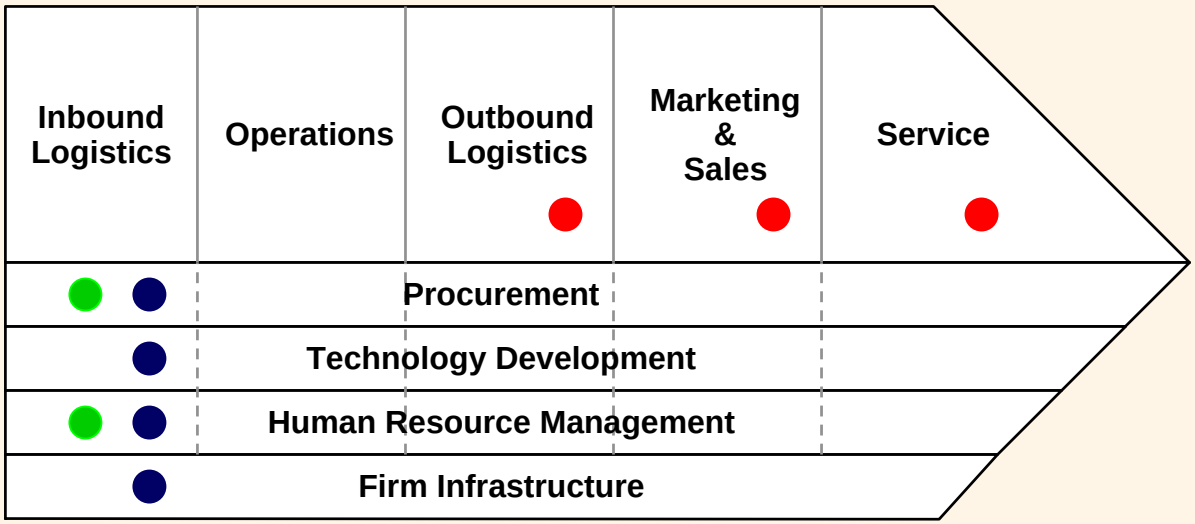

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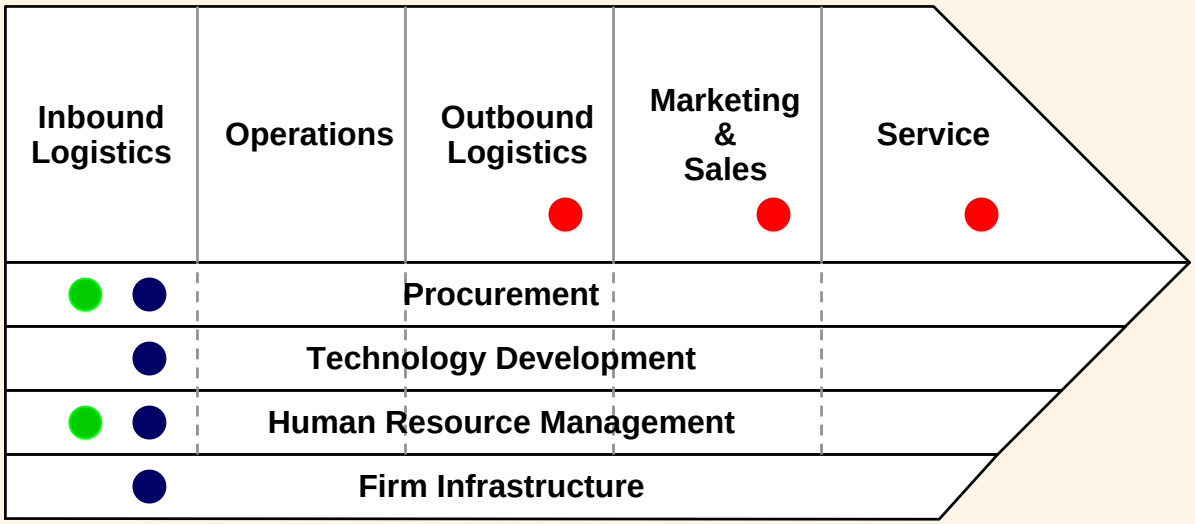
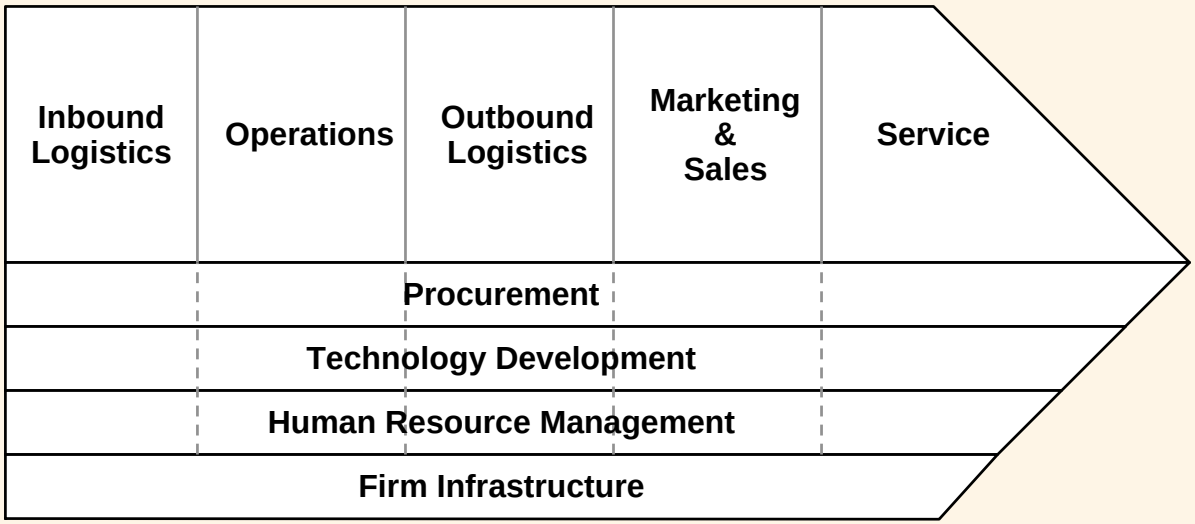


In a grant-funded environment, the primary value-adding activities are funded with **direct** dollars, whereas the support activities are funded with **indirect** dollars.

The Value Chain: *Commerce*

Despite increased recognition of its importance, investment in IT to support public-sector, grant-funded research is currently falling behind the private sector. Why?



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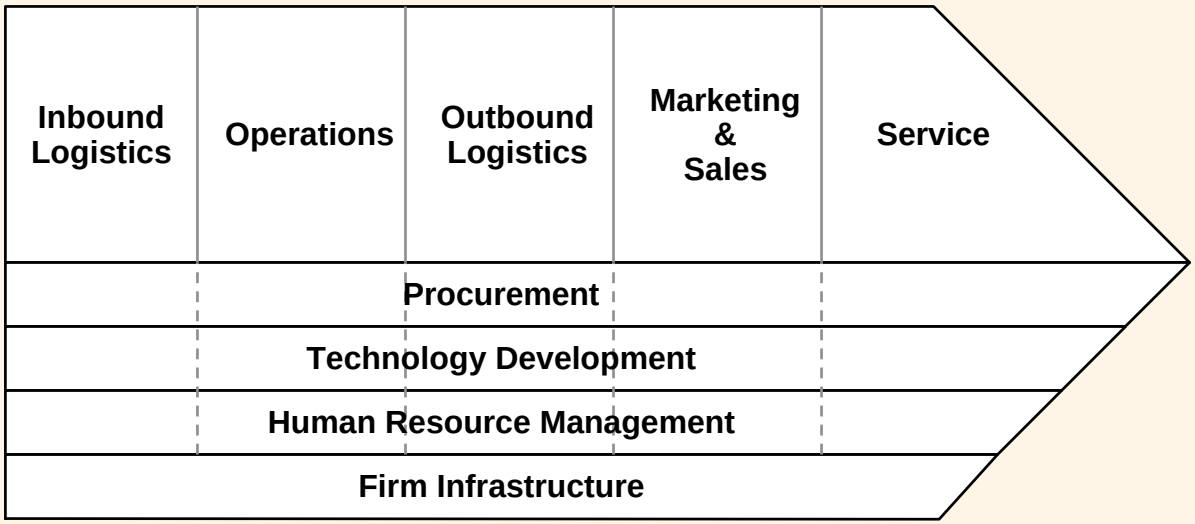
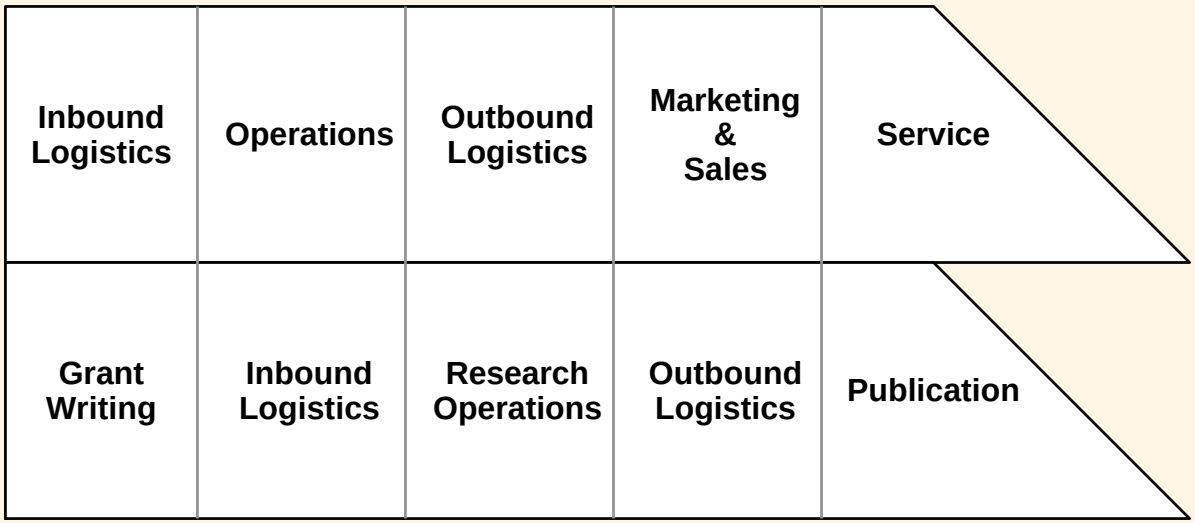
Despite increased recognition of its importance, investment in IT to support public-sector, grant-funded research is currently falling behind the private sector. Why?



Other factors complicate the daily management of and the long-term planning for IT operations in a biomedical research organization.

The Value Chain: *Commerce*

First, even at a generic level, the value-adding activities for research are different from those of commerce.



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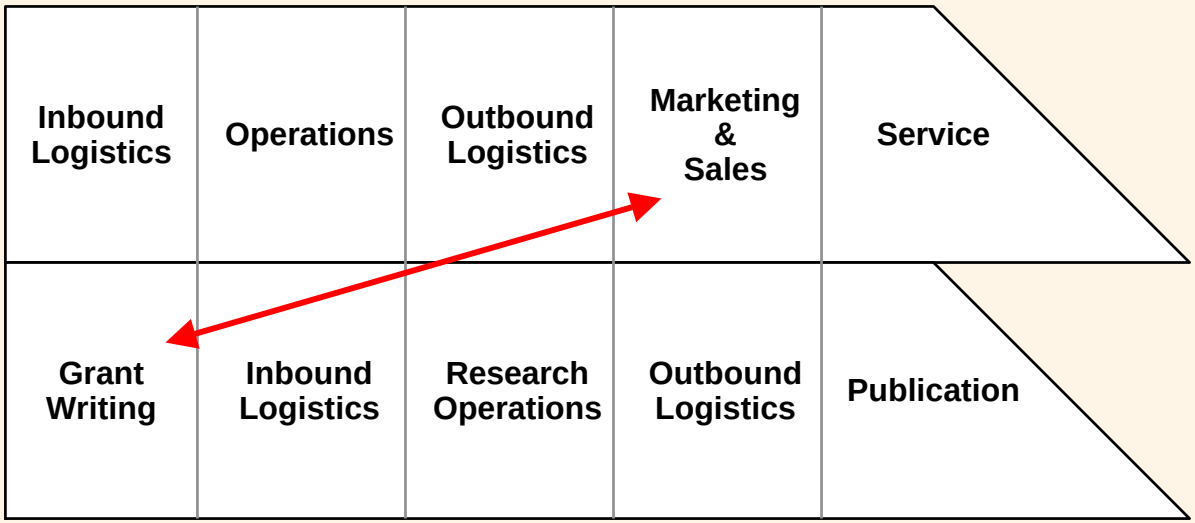
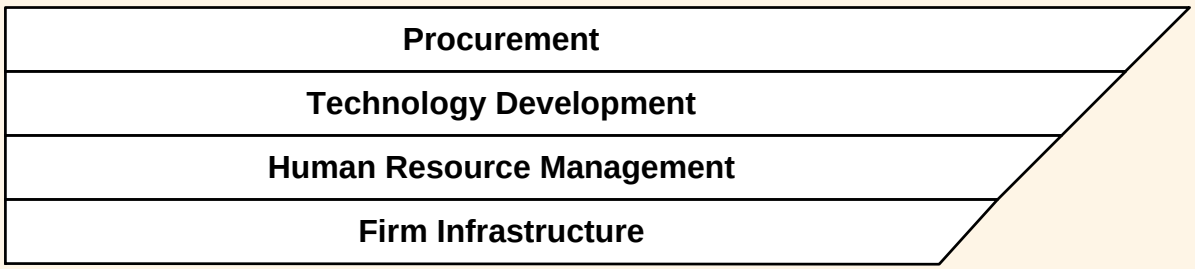


Not only are the categories somewhat different, but there is a significant reversal in time sequence of some components.

The Value Chain: *Commerce*

Although some differences exist in the support activities, these are not as significant as those in the primary activities.



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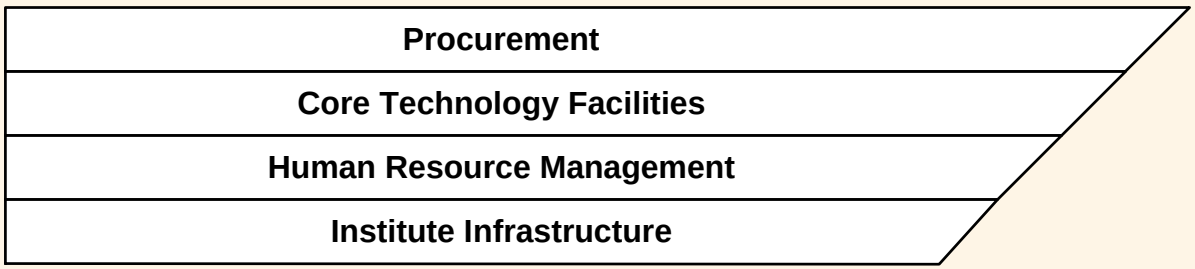
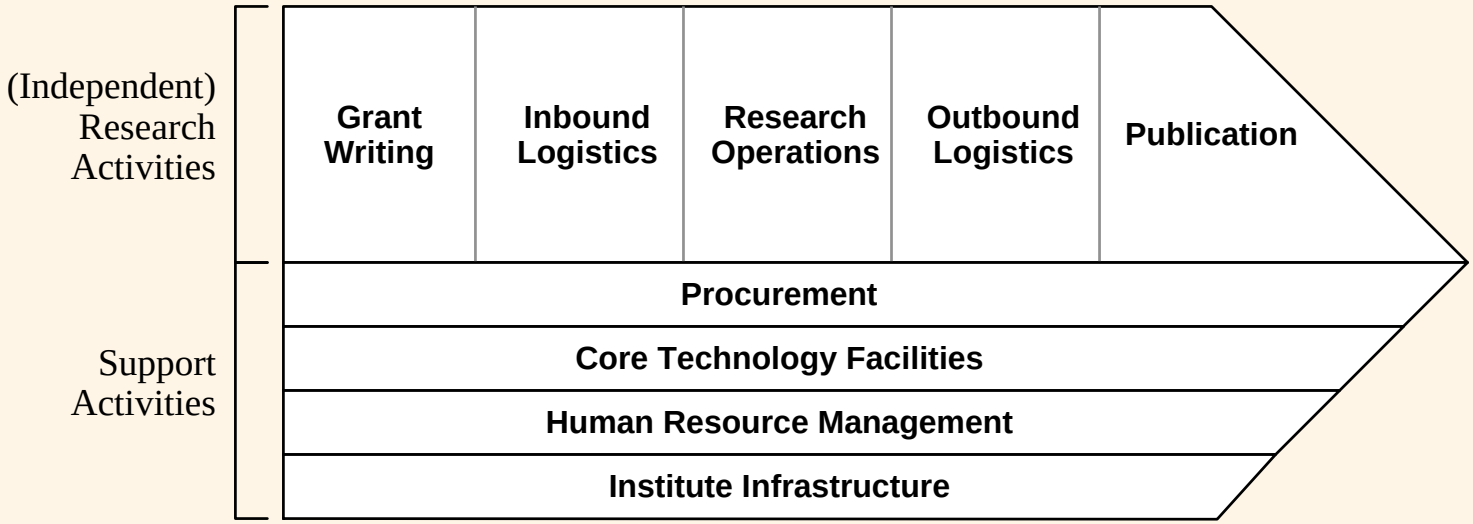


The Value Chain: *Research*

Combining these adjustments we get the following “Porter diagram” for research.



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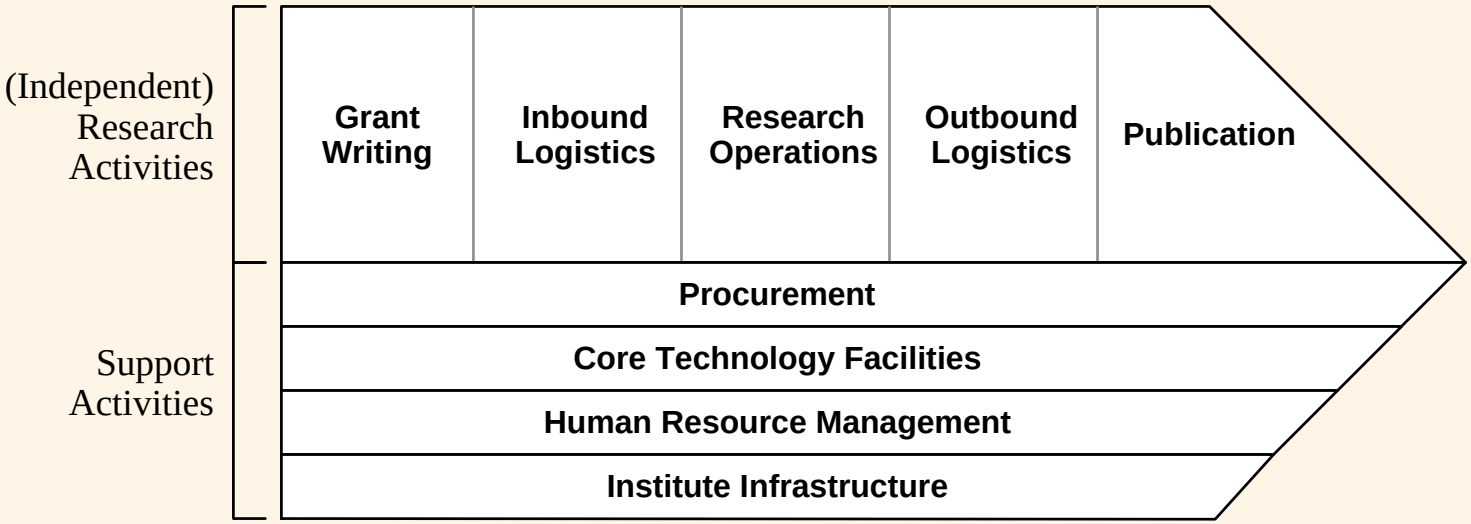
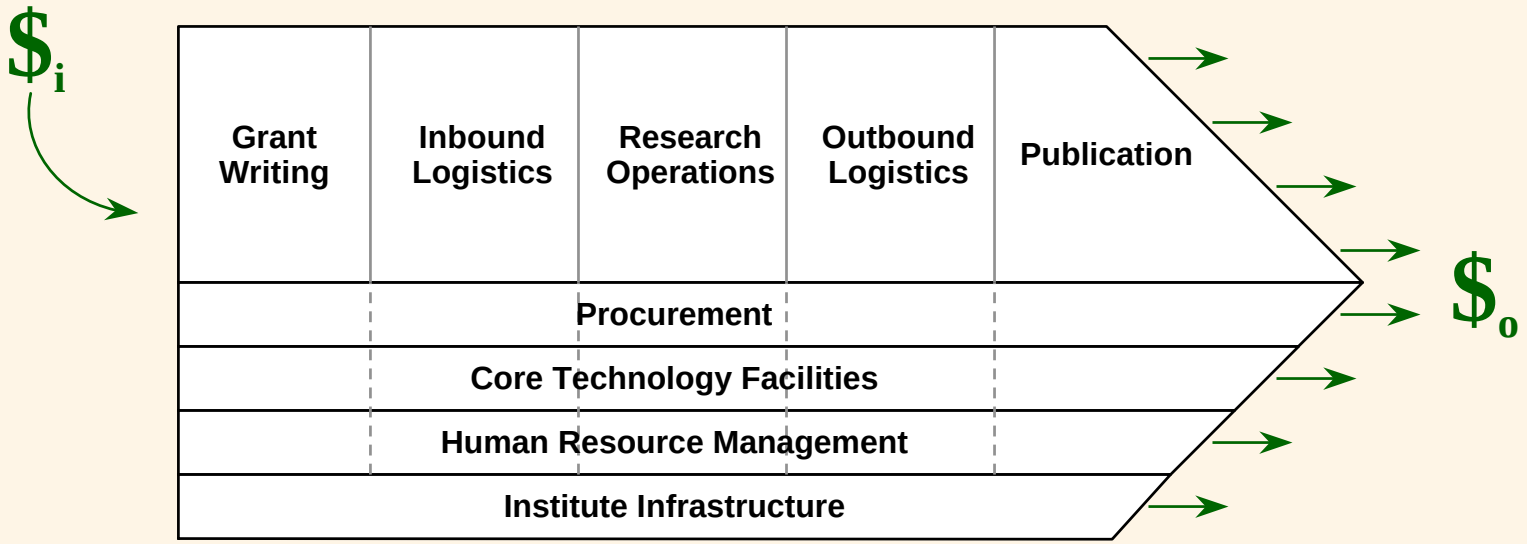


Now we can consider some other complicating factors…

The Value Chain: *Research*

Cash flow is backwards, in that “income” precedes expenses. Furthermore, “income” is really just authorization to request reimbursement for appropriate expenses.



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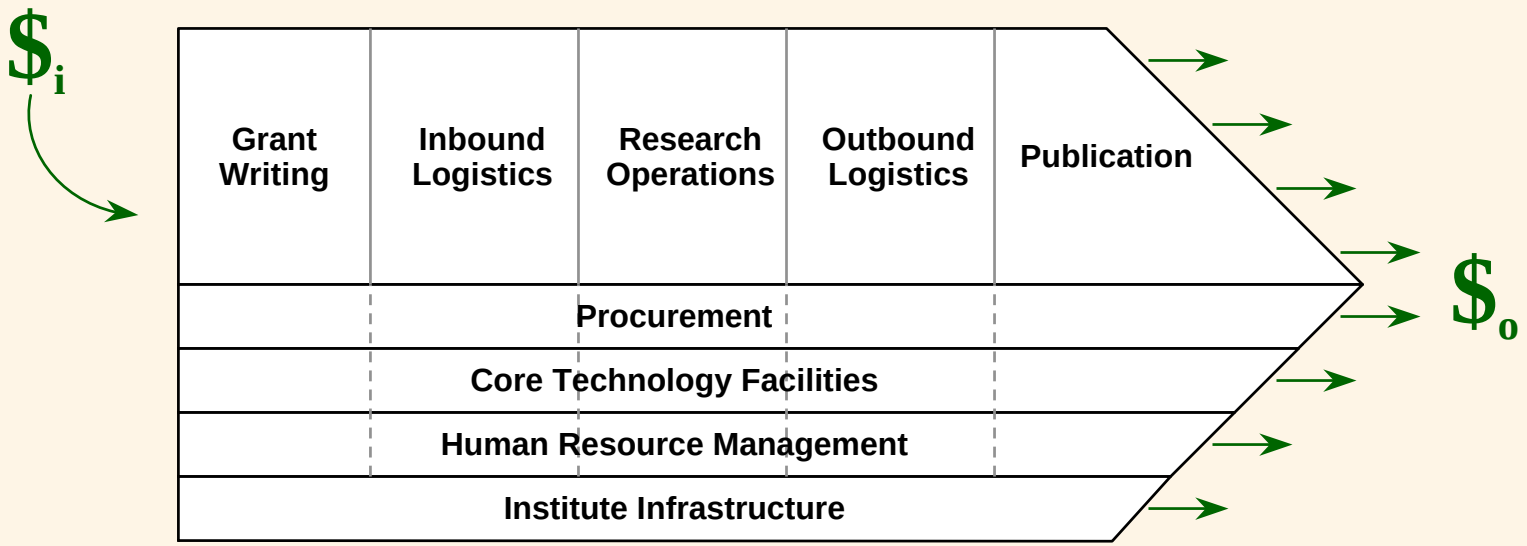
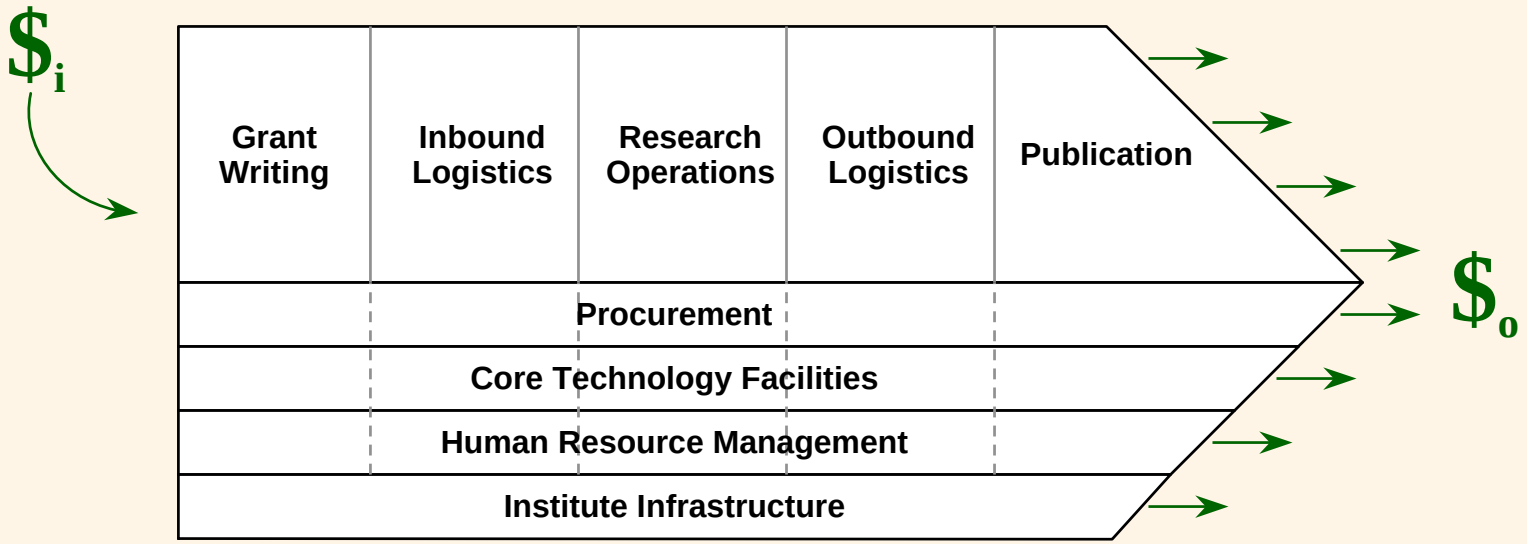


Because $\$_I$ is capped as a reimbursement for an approved subset of $\$_o$, $\$_i$, must always be less than or at best equal to $\$_o$. This means there can never be a real profit margin.

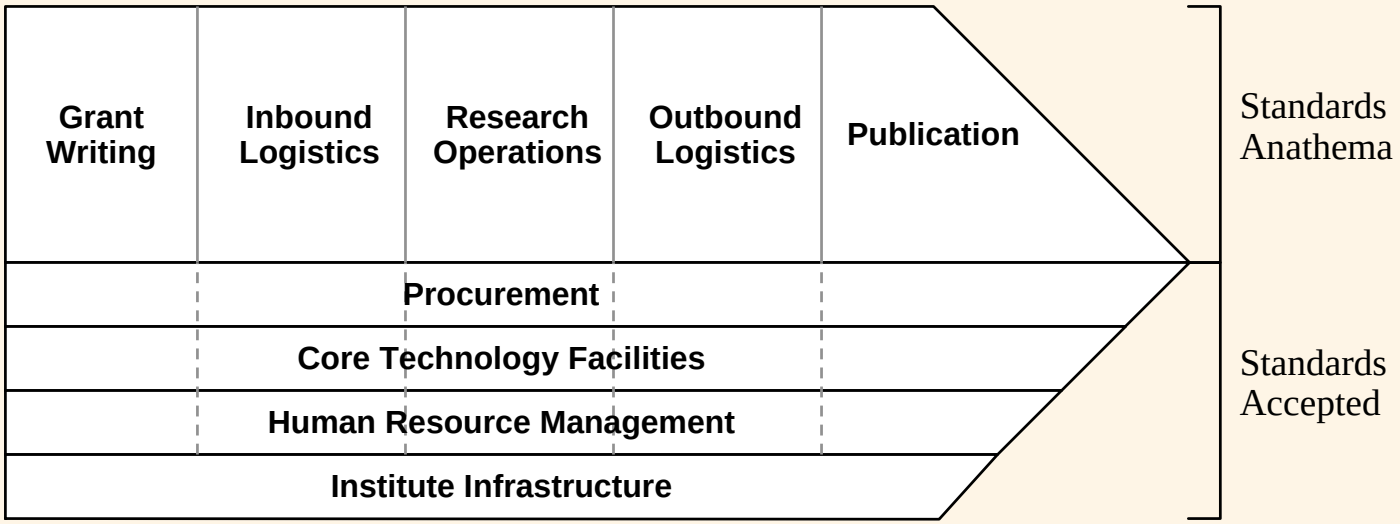
The Value Chain: *Research*

Without a profit margin, true strategic investment in IT is difficult, if not impossible.



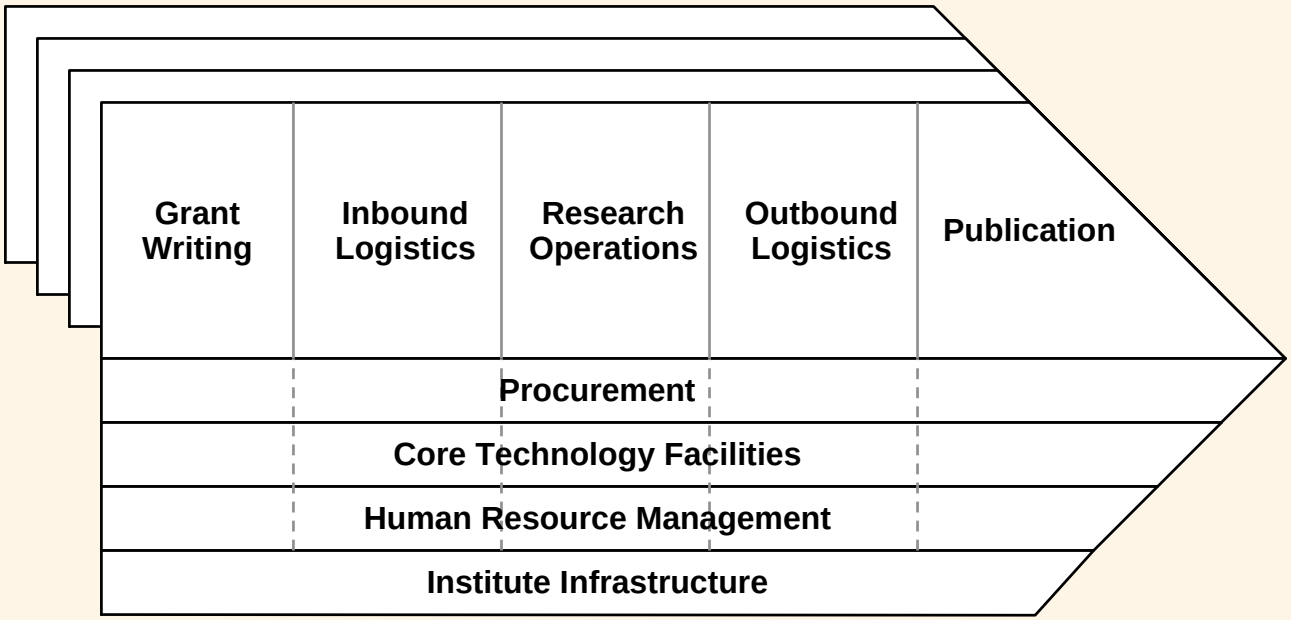
Thus, compared with private-sector enterprises, IT investment in grant-funded research organizations is often trivial and ineffective.

The Value Chain: *Research*



The sociology of public-funded research activities resists efficiencies in the value-adding chain. Much of this resistance is **legitimate**.

The Value Chain: *Research*



In a grant-funded research organization, there are multiple value-adding chains, one for each independently funded research activity.

The Value Chain: *Research*

Aligning IT operations with hundreds of independent research activities (each with its own dynamic goals, budgets, staff, and timelines) is not easy. Indeed, efforts to achieve *specific* alignment with all of these activities must fail.

value-adding chains, one for each independently funded research activity.

The Value Chain: *Research*

The trick is UNDERSTANDING the process and values of research.

With understanding, and acceptance, real alignment can be achieved.

value-adding chains, one for each independently funded research activity.

Understanding Research

Business Model

- The Porter value-chain analysis shows that the funding model, and the value-adding process of grant-funded research is fundamentally different from that of businesses that sell goods or services to consumers.
- Measuring ROI is metaphorical (at best)
- No common measurement for success – i.e,, no bottom line

Understanding Research

Operational Practices

Understanding Research

Operational Practices

- Independent
- Portable
- Third-party pay; Third-party rewards
- Deals with the unknown, cannot be standards driven
- Intensely opportunistic
- Pan-enterprise collaboration

Understanding Research

Cultural Norms

Understanding Research

Cultural Norms

- Ultimate goal: extraction of new knowledge from nature
- Values-based life style
- Strong differences among fields (and researchers)
- One-off solutions are common

Understanding Research

Cultural Norms

- Skepticism is a given
- Evidence is expected
- Logic is required
- Criticism is a primary form of discourse
- Understanding is the goal: NT triumphant

Improving IT Operations

Alignment Revisted

Aligning IT with Research

Aligning standards-driven efficient IT with opportunistic effective research requires some creative thought that seeks synthesis in contradiction:

- We must provide centralized support for decentralized operations.

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Aligning IT with Research

Aligning standards-driven efficient IT with opportunistic effective research requires some creative thought that seeks synthesis in contradiction:

- We must provide centralized support for decentralized operations.
- We must find standard solutions for one-off problems.
- We must work with our peers (even if we don't really have any).

Meeting Theme

BRIITE

Biomedical
Research Institutions
Information Technology
Exchange

Semi-Annual Meeting
27-29 April 2005
Houston, TX

Hosted by:

THE UNIVERSITY OF TEXAS
MD ANDERSON
CANCER CENTER
Making Cancer History®

IT Operations in a Biomedical Research Organization

END