

# ***n*-dim Project**

Eswaran Subrahmanian

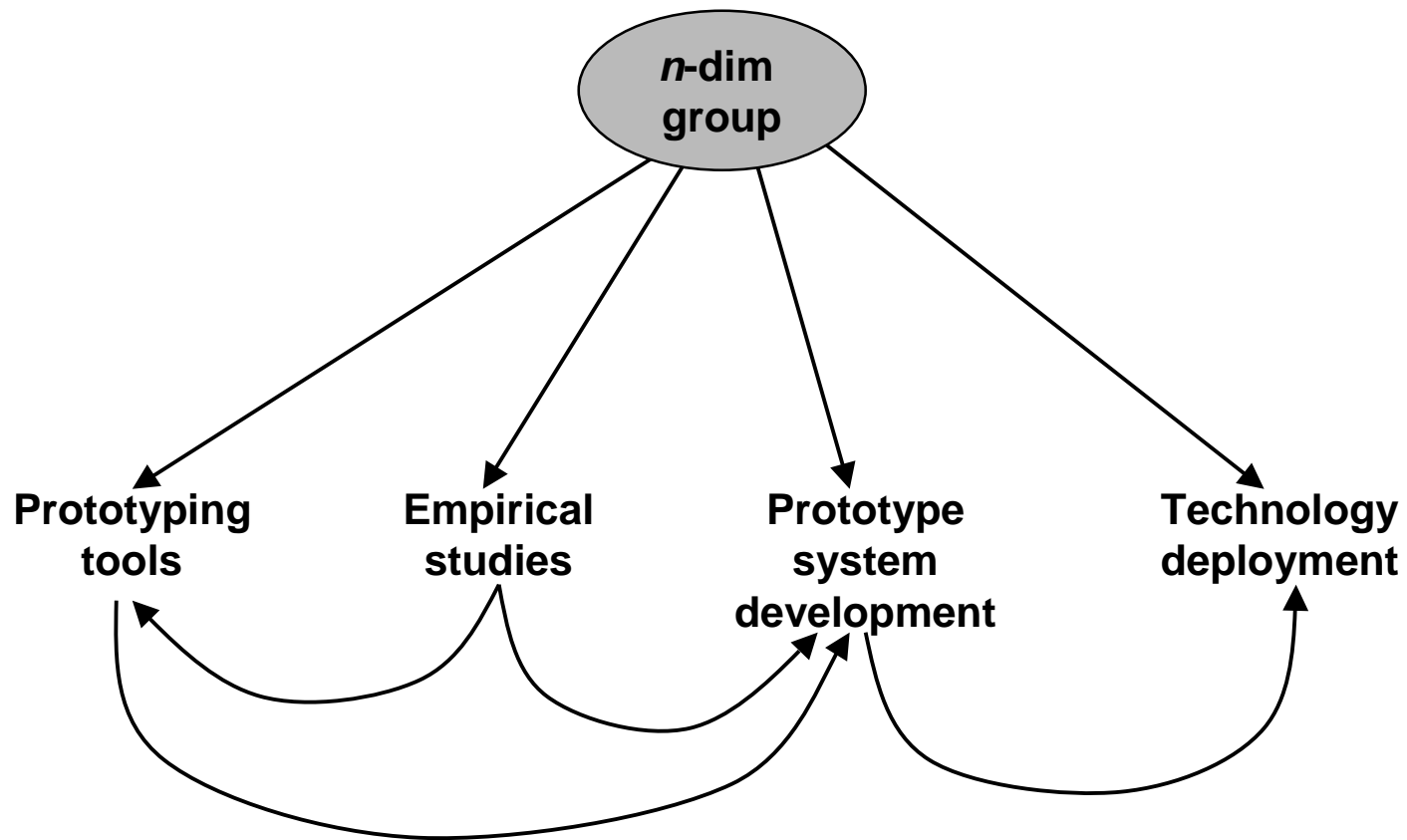
*and the n-dim group*

ICES

Carnegie Mellon University



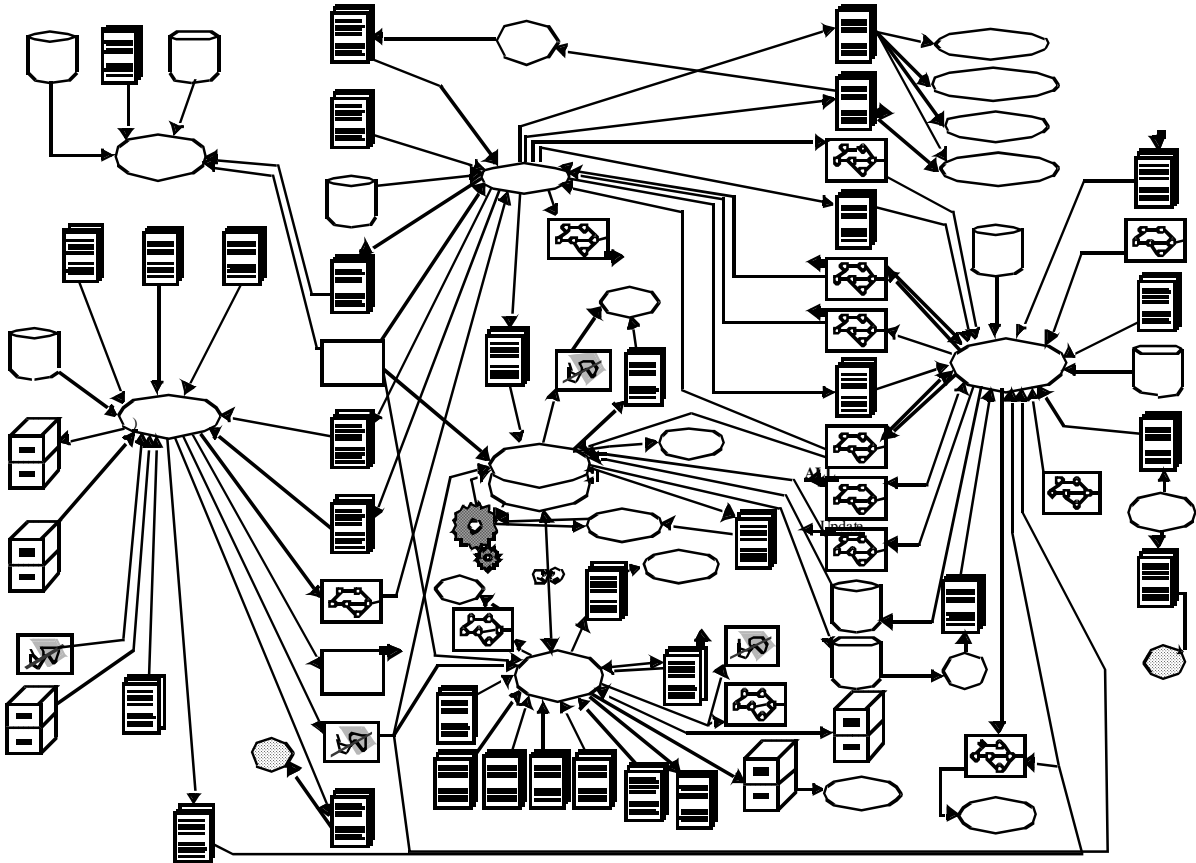
# Scope of Explorations



Case Study 1

# ABB: Hydro Power Design

## Information Flow Study



## Case Study 1

# ABB

### Problem

- ABB decided to consolidate design knowledge and process from seven different design centers acquired through mergers

### Goals

- Better designs
- More uniform designs
- Faster designs
- Prepare organization for new technology

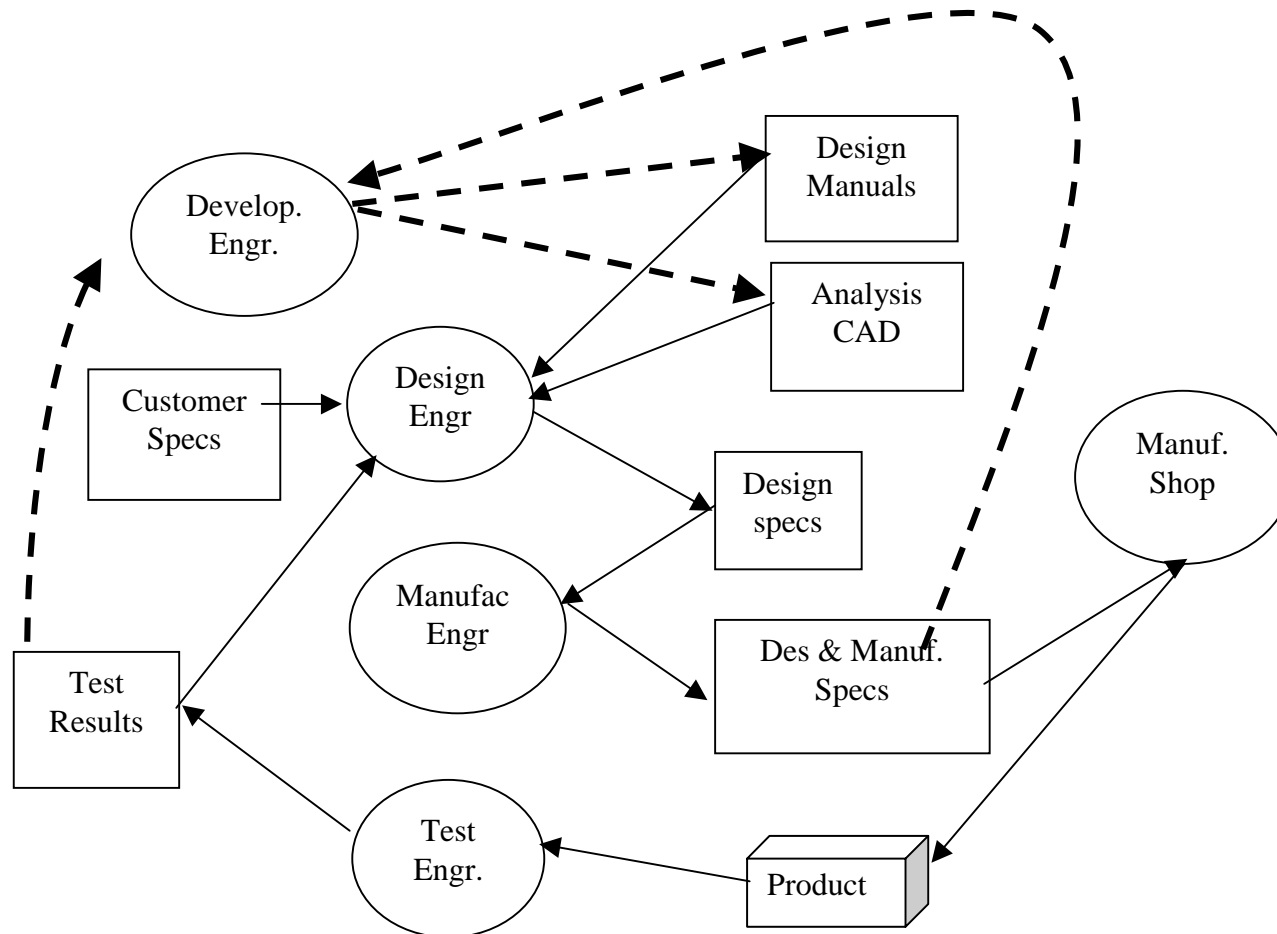
## Case Study 1

# ABB

## Outcome

- Tool unobtrusively intercepted all design data movement between documents and into and out of database
- Created an n-dim model showing history and relationships
- ABB hardened final version in SMALLTALK
- ABB engineer expects tool to give dramatic quality improvement

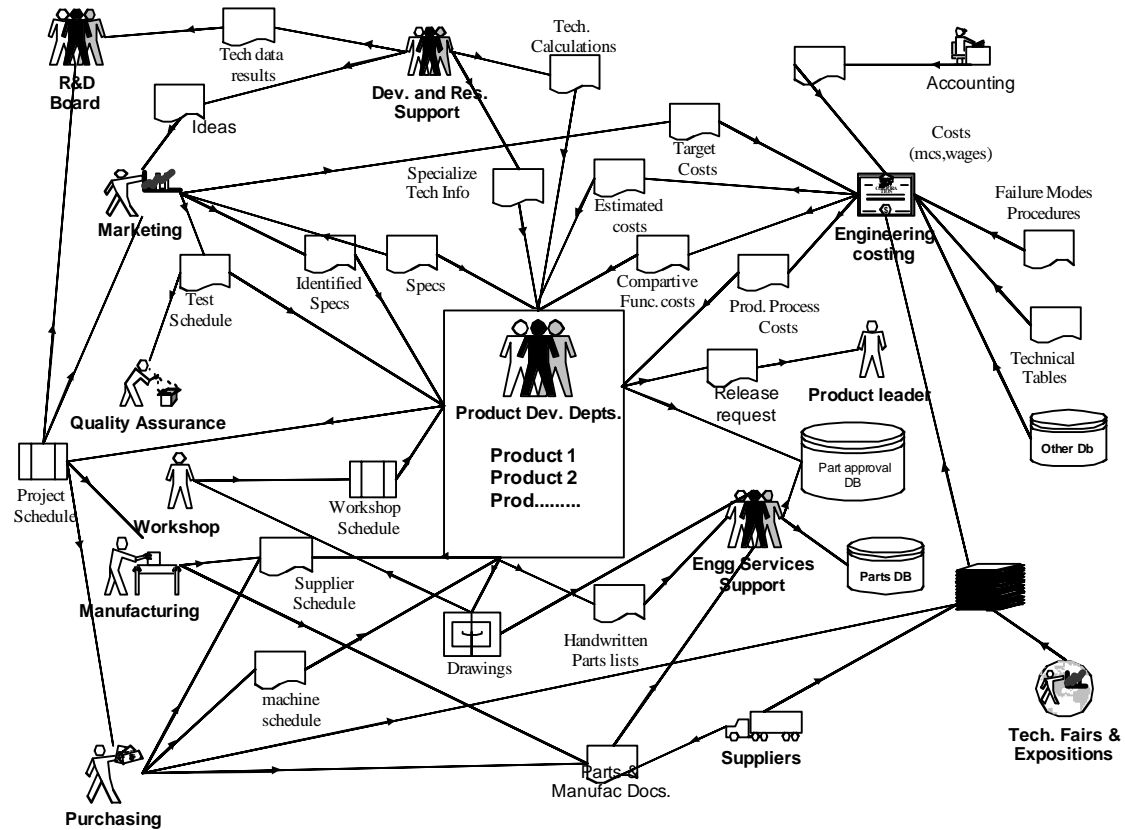
# Process History for Analysis Tools



## Case Study 2

# Bosch: Consumer Products

## Information Flow Study



## Case Study 2

# Bosch

### Problem

- Introduce IT into the redesign of the design and development process

### Goal

- To allow teams of designers from around the world to work together on design by creating group and functional living repositories of information from different departments

## Case Study 2

# Bosch

## Outcome

- A community document management system, prototype and specification
- Transfer of methods for system testing and development
- A re-implemented production system is in use

## Case Study 2

# Bosch

The image shows two overlapping screenshots of a Microsoft Internet Explorer browser window. The top-left screenshot displays a document directory page with the following content:

- Document Directory**
- Alpha testers**
- Event Broker API**  
This is the first cut at a specification for the Event Broker.  
(Russell C. Milliken, November 2, 1998, application/frame)
- Initial Interview with LIRE participants**  
Interview with research group after a 2 month trial run of LIRE.  
(H Granger, 1998, text/plain, 8870 bytes)

The bottom-right screenshot shows the details for the document "Initial Interview with LIRE participants":

**Document Information**

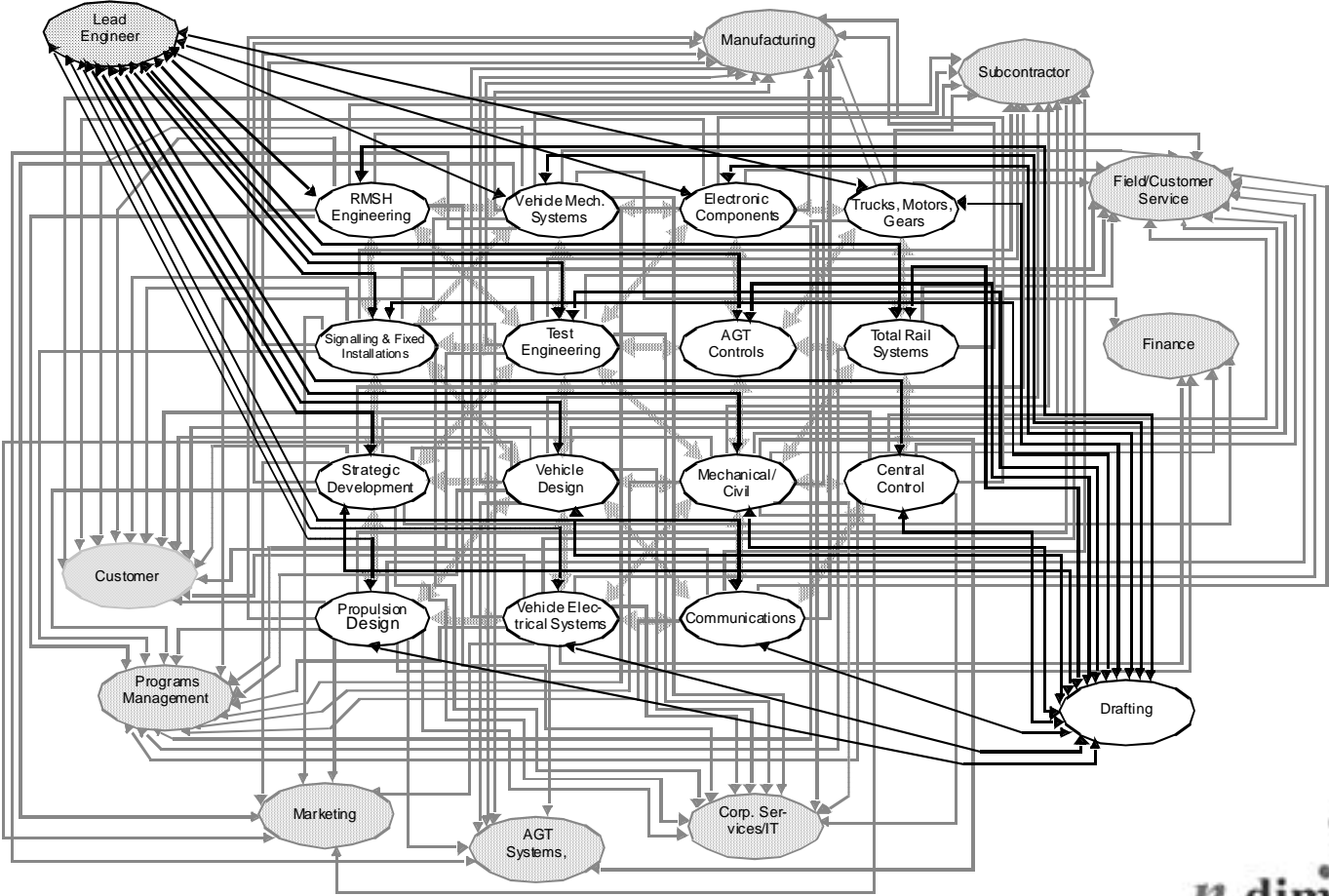
Attributes	Status	Versions	Annotations	References	Alerts	Access	Keywords
Initial Interview with LIRE participants							
Author:	H Granger			Publication date:	1998		
Abstract:	Interview with research group after a 2 month trial run of LIRE.						
Owner:	Document Type:	Department:					
tbelden	Paper	ices					
<b>Directory Locations:</b>							
Document Directory/ Alpha testers/							
Document Directory/ More Users/ The ndim Group/ Hgranger/							



Case Study 3

# Adtranz: Transit Systems

## Information Flow Study



## Case Study 3

# Adtranz

## Problem

- Improve the ECN process

## Goals

- Eliminate unnecessary engineering changes
- Eliminate unnecessary follow on ECNs
- Eliminate errors in ECNs
- Reduce time to process ECNs

## Case Study 3

# Adtranz

## Outcome

- Prototype ECN workflow system designed, tested, and implemented
- System will create cost savings
- System will create Better control of designs and online documentation for customer and training
- System can be customized for other engineering firms

# Case Study 3

# Adtranz

Adtranz Project - Microsoft Internet Explorer

File Edit View Favorites Tools Help Links

**ECN Form**

## Change Existing Part

**Enter part number**

Part number:  
(full drawing and item number, i.e. xxxxFxxH0x)

OR

A drawing number to view a drawing:

Enter the number of the part to which you want to make a change. If you look at a drawing find the part number, enter the drawing number and hit continue and the drawing number will be displayed for you.

Continue Cancel Help

B:\Adtranz\Production\HTML\Vol3.html - Microsoft Internet Explorer

File Edit View Favorites Tools Help Links

## Adtranz Engineering Change Notice

ECN #22345 Page 1 of 5

<b>Class of Change</b> Class II Change	<b>Effectivity Date:</b> 3-14-01	<b>Hardware Affected</b> Guide Wheel Assemblies
<b>Programs Affected:</b> Gatwick Pittsburgh Frankfurt Dallas Toronto	<b>Reason For Change:</b> Obsolete Parts	<b>WR/ECN Number:</b>
<b>Brief Description Of Change:</b> Change material and add heat treat specifications and create a new washer. Add/delete the new/former washer in the guide wheel assemblies that use the washer.		
<b>Rationale Of Change:</b> Large diameter washer used on the 1502F63 Design Guide Wheel Assembly needs to be strengthened to better resist wear.		
<b>Total Material Requirements:</b>		
<b>TCN: Task:</b> 126758 Engineering time		
<b>ECN Affects:</b>		



# Benefits and Results of Our Process

- An information landscape of the company
- Transferable methods for information system design
- Technology made to fit – tested in the environment of use
- User accepted technology from user participated design
- Technology with applications beyond the immediate scope of the project

# Project Resources

- 3 years
- Joint n-dim group and industry team
- Access to site (people and place) for empirical studies
- Approximately \$400,000 per year for CMU

## What else do we do?

- Create components for building collaborative systems
- Test components in use settings
- Study work practices in groups

# An Architecture for Collaborative Systems

