# Design from failure

- A framework for NFF failure analysis and efficient redesign

SF Lab UNIST http://sf.unist.ac.kr Design from failure **Content** 

01 Motivation

02 Objective

03 Workpackage

04 Proposal Plan

**05 Expected Result** 

1984's	Company	Sales (100 million won)		
1	Daewoo (대우)	3,379,109		
2	KNOC (유공)	2,791,753		
3	Samsung C&T (삼성물산)	2,554539		
4	Hyundai Engineering & Construction (현대건설)	1,784,785		
5	Hyundai corporation (현대종합상사)	1,549,553		
6	Sunkyoung (선경)	1,493,884		
7	Lucky-Gold star International (럭키금성상사)	1,351,648		
8	Samsung electronics (삼성전자)	1,295,652		
9	Goldstar (금성사)	1,295,652		
10	Gookjae Sangsa (국제상사)	1,031,128		
Course - Dandast of Korsen listed companies				

Source : Pandect of Korean listed companies

2011 's	Company	Sales (million won)
1	Samsung electronics (삼성 전자)	120,815,977
2	SK Energy (에스케이에너지)	50,201,326
3	GS Caltex (지에스칼텍스)	44,954,889
4	KEPCO (한국전력공사)	43,214,858
5	Hyundai Motors(현대자동차)	42,774,077
6	POSCO (포스코)	39,171,703
7	S -0il(에쓰오일)	31,913,863
8	KOGAS (한국가스공사)	28,254,771
9	LG electronics (엘지전자)	28,097,139
10	KIA Motors (기아자동차)	27,742,277
- 1		Source : KOCHAM BIZ





#### KANO model





- Prototype and Hardware based learning
- Math Basis for Analysis
- (Check & Fix)
- SPC monitoring

#### Concurrent

- Compressed Hardware based Learning
- Math Basis for Synthesis (Virtual Validation) and Analysis

#### Continuous

- Synthesis Based Learning
- Prototype and Hardware to **Confirm Synthesis and Validate Integrated Product**

## Closed & asynchronous product development process

- ✓ Product lifecycle
   No fixed starting & ending points
- Information & knowledge
  Anyone, Anytime, Anywhere





#### Rectify

New technologies

#### Responsiveness

Environment change, introduction of new regulations, the change of customer preference

#### Resilience

Severe faults found





### Failure Occurrence of KTX and KTX-Sancheon

		КТХ	Sancheon
No. of trains	$\rightarrow$	46	19
No. of failures	$\rightarrow$	25	28
Failure ratio	$\rightarrow$	54.3%	147.4%

### In 2011, KTX Sancheon main failure record

#### Date

#### Details

- 26. Feb Engine Malfunction
- 15. Feb Tele-communication problems
- 11. Feb Derailed near Gwang-myeong stations
- 06. Feb Battery malfunction



'사고뭉치' KTX-산천 이젠 리콜까지

최근 KTX 사고가 잇따라 발생하는 것은 차량 제작과 정비 과정에서의 총체적 부실이 빚어난 결과라는 각사 결과가 나왔다.

P.C.

가슴성형으로유명한곳.바로여기!

labor union

### 2 Design from failure Objective & research road map



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#### 2 Design from failure Objective & research road map



Design from failure WP1. Eventdriven NFF root cause failure analysis

3.1



### Design from failure **3.**1 Design from failure **WP1. Event-driven NFF root cause failure analysis**



Is any product manufactured within the current tolerance-limits defect free?

#### **NFF(No-Fault-Found) Failures**

- User's behavior oriented failures
- Unforeseen failures
- Failures of product that have passed all inspection

### 3.2 Design from failure WP2. Change propagation network



#### 3.3 Design from failure WP3. Redesign decision



## 3.3 Design from failure WP3. Redesign decision



#### 4 Design from failure Research Plan



### **5** Design from failure **Expected Result**

![](_page_18_Picture_1.jpeg)

#### From feedback information,

- ✓ Analyze the root cause of NFF failures
- ✓ Rectify the failures
- ✓ Prevent occurrence of the same failure

![](_page_18_Picture_6.jpeg)

## **THANK YOU**

Any other Questions?