The Polaroid SX-70 Camera

A case study

Introduction

- **A fairy tale…**
  - "…great technical achievement but the beginning of a whole series of financial disasters…"
- **Topics**
  - Relationship between innovation, standardization of processes and transaction costs, modularity, disruptive innovation

Transaction Costs

- These include the cost associated with negotiating, writing and enforcing contracts
- These is a trade-off between transaction costs and internal production costs, between vertical integration and outsourcing that pushes the firm towards the more convenient strategic option, namely the less costly
- When such costs are high, a firm may engage in opportunistic behavior: taking advantage of another when allowed by circumstances

Modularity

- **Modularization**
  - An increasing number of products are being produced in a modular fashion across many organizations (Langlois and Robertson, 1992)
- Modularity, is seen to be a rational response to complexity (Simon, 1962)
  - By dividing up a complex system into pieces that connect with one another at pre-defined interfaces within a given architecture, modular designs are seen to evolve more quickly and effectively as compared to ‘integrated’ ones (Langlois and Robertson, 1992)

Disruptive innovation

- Sustaining innovations
  - those demanded by customers
- Disruptive innovations
  - Innovations that do not satisfy current customers
- Disruptive innovations have:
  - Lower performance according to customers' standards and from what they want
  - Other performance attributes which are not valued by current customers that make it prosper in a new value network
  - As performance improves, they displace former technologies

- Companies can be held captive by their most profitable customers
- Indirect control of the resource allocation process

Examples

Technology	Replaced…	+	-	Initial markets
Transistor radio	Analogue radio	Portable Low consumption	Sound quality	Teenagers
LCD TV	CRT TV	Low weight Low consumption	Image quality	Mobile phones

Source: **Christian Sandström** (www.disruptiveinnovation.se)

A Case Study: The Polaroid SX-70

- The Polaroid SX-70 saga provides a good example of these concepts
- A radical alteration of the design required Polaroid to combine knowledge across existing partitions
  - As Polaroid redrew its firm boundaries to accommodate this radical change, it set in motion a chain reaction in its larger production network that worked to undermine **the true impact of its radical innovations**
  - Efforts to redraw firm boundaries were not costless
    - a cost that is not explicitly considered within the transaction costs perspective

About Polaroid Corporation and the Land camera

- Founded in 1937 by Edwin Land
- He invented a type of synthetic plastic sheet used as polarizer
- Best known for inventing instant imaging technology
  - Polaroid managed to automate and enclose an entire development laboratory in a small, hand-held camera
    - Based on a film pack of 10 pictures inserted into the camera
    - Images were exposed onto a roll of negative photographic paper that met up with a roll of positive paper
    - A chemical reagent allowed the image to develop and transfer onto the positive

An iconic company

- Despite the poor picture quality, the inconvenience of having to peel the negative apart from the positive, and the litter created in the process, the **Land camera** (1947) was an instant hit:
  - Sales went from $6.7M in 1949 to $550M 20 years later
  - Polaroid became a technology-driven company
  - Edwin Land himself held over 500 patents

Polaroid and the stakeholders

- The interests of several stakeholders were embodied in Polaroid's design
  - In the Land camera, Polaroid was responsible only for the positive, the pod containing the chemical reagent and some of the final assembly
    - Camera manufacturing was outsourced mostly to
      - U.S. Time Corp.
      - Bell and Howell Corp.
    - The camera operated on standard batteries
    - Kodak produced color negatives for Polaroid's instant films
      - Receiving $1 for every film sold, and reportedly making an 80% pre-tax profit on these sales

Polaroid-Kodak agreement (1957)

Strength

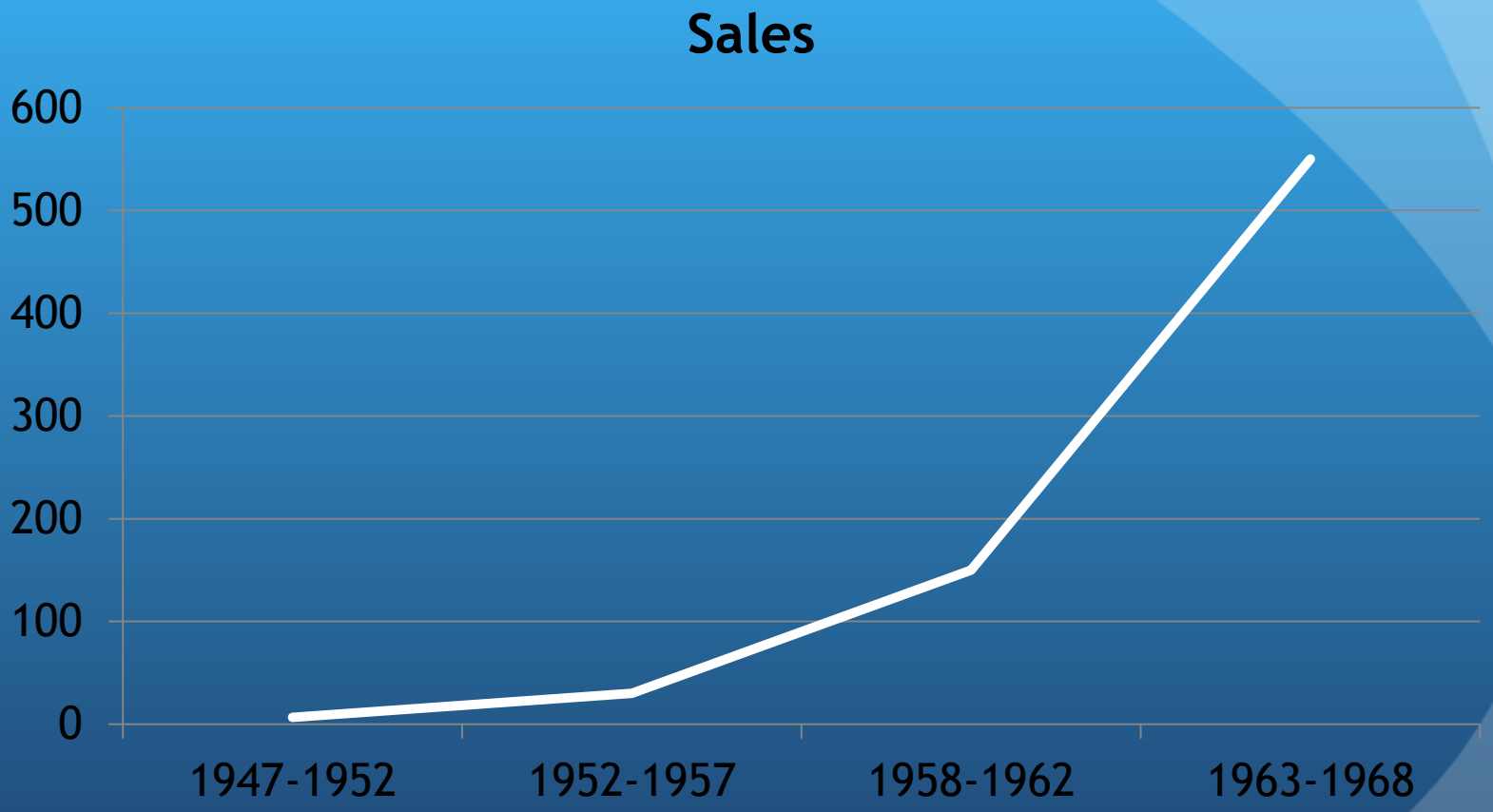
"… two groups with complementary talents, competences and facilities can cooperate within a framework of mutual respect to bring to the country an extraordinarily useful field, in finished form, five to ten years sooner than it could have become available without the cooperation"

Weakness

"The processes which we used at Polaroid to make the negative for the 1957 picture on the cover…[had] …a higher degree of technological elegance than the processes finally adopted, jointly, for the manufacture by **Kodak** of the Polacolor negative"

from Polaroid's 1972 Annual report

Polaroid sales 1947-1968



from T&F Database 2009

Standardized EBT= 0.8

The SX-70

- In the mid-1960s, Polaroid started working on a revolutionary new film and camera system that would render the existing technology obsolete.
  - The SX-70 was to be
    - fully automatic
    - single-lens-reflex (SLR)
    - small enough to fit into a pocket.
  - Although the utility to users was at the center of such a design, it was largely driven by Edwin Land's vision.

- **Camera design**
  - No separation of the negative from the positive implied that the two would have to come together as one integral whole
  - The picture would have to develop by itself in ambient light.
    - Reengineering the film was not easy

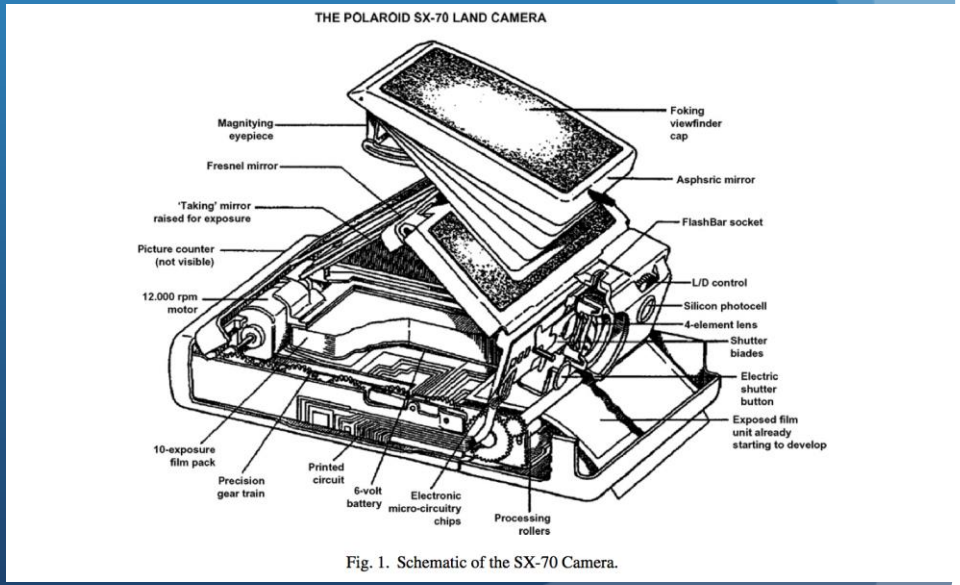
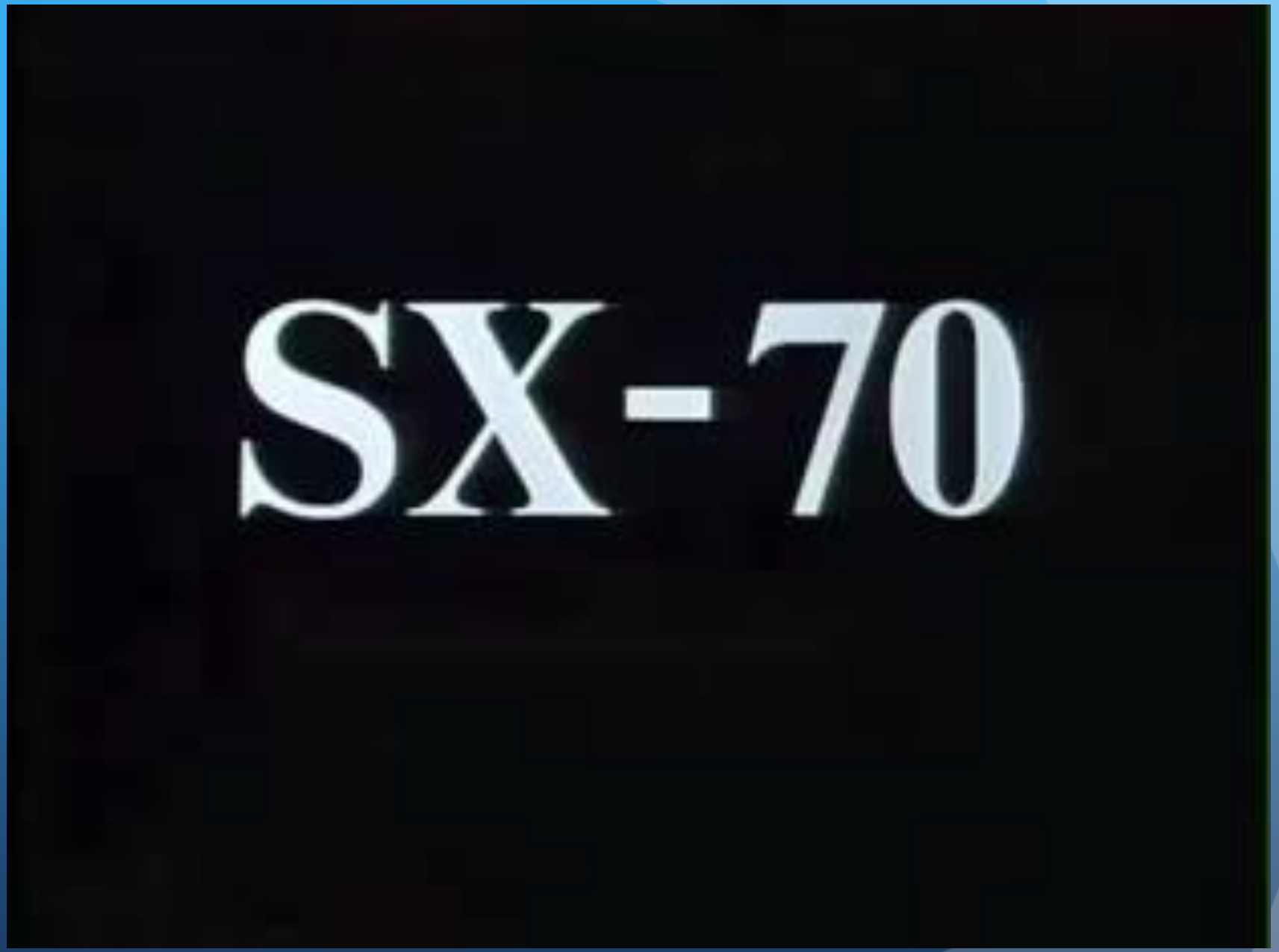


Fig. 1. Schematic of the SX-70 Camera.


SX-70

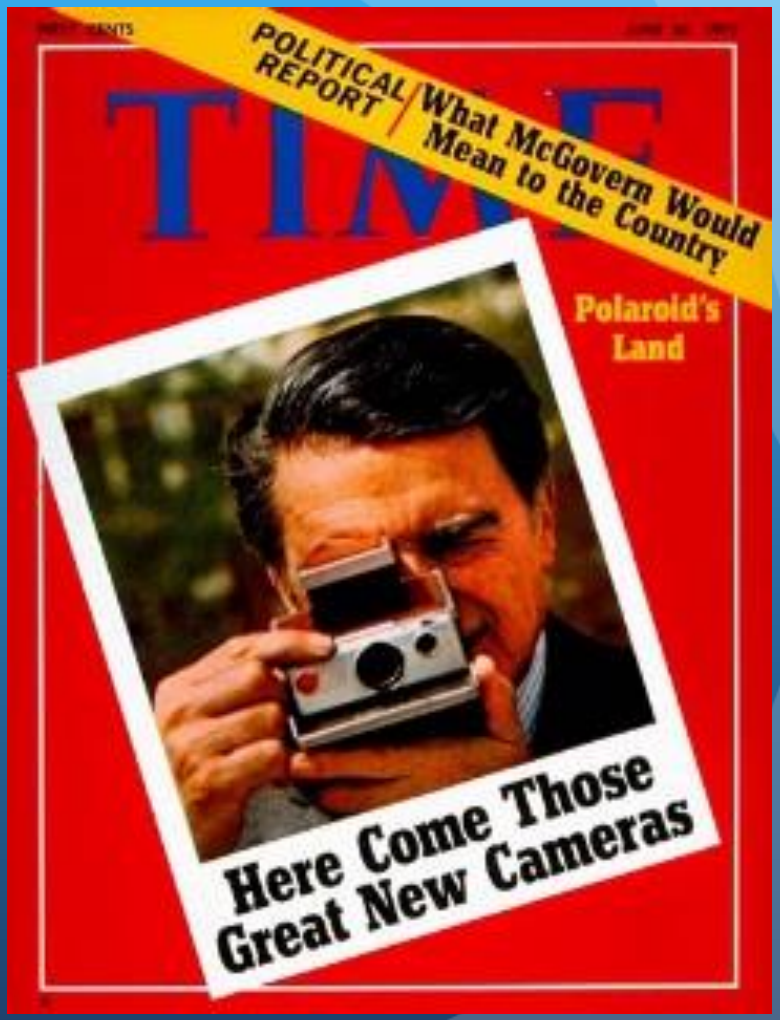
Polaroid's Aim

- A revolutionary product
- From "peel-apart" to "integral film":
  - Self developing picture in ambient light (opacifier technology)

Polaroid's SX-70 camera

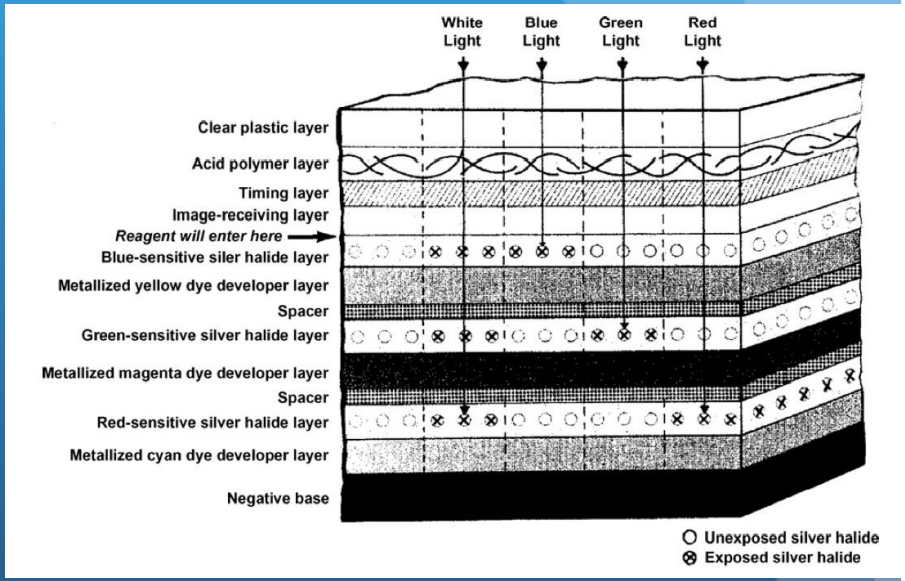
A technological tour de force

- Launched in 1972, it caught the imagination of millions
  - On the cover of 'Time' and 'Life'
  - Fortune defined the production of the SX-70
    - "one of the most remarkable accomplishments in industrial history"
- However, the SX-70 venture dramatically altered Polaroid's organization, its relationships with vendors, its competitors, customers and other institutional stakeholders

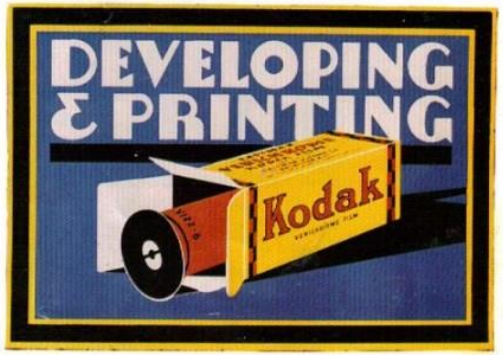


The film

- Given the numerous, ongoing complex interactions between the 13 different layers of the film used by the SX-70, its production was very challenging.
- It was clear that working out these interdependencies would require complex transfers of information across the negative and positive physical interfaces.



The agreement



- Prior to the SX 70, Polaroid did not have the capital and resources to build a negative manufacturing plant.
  - Kodak made it possible for Polaroid cameras to be offered in the first place.
- However, in entering into a relationship with Kodak
  - Polaroid had to compromise on its original specification for the negative
  - As Polaroid's success in the photographic market grew, its relationship with Kodak shifted from being "complementary" to a competitive one.
- With Polaroid's transformation from "the little company" to a potential rival
  - Kodak became increasingly unwilling to accept Polaroid's design changes
  - Polaroid, became increasingly frustrated by the limitations that this relationship imposed on its creative abilities

The end of the agreement

- Polaroid continued working on a new type of film in its laboratories
  - Kodak only came to know of Polaroid's experiments with a new type of film in 1968, When Edwin Land showed Kodak's VP of Research some photographs made on the new material.
- Kodak was stunned
  - A year later it canceled the 1957 agreement
- The termination of the contract started a *war* in the field of instant photography
- Kodak
  - never offered to revise the existing contract
  - took Polaroid's move as an affront to its position in the industry
  - announced a crash program to come up with an instant photography system of its own

Polaroid's reaction

Polaroid

- Was forced into negative manufacturing, an area in which it had no previous experience
  - the competitive dynamics between Polaroid and Kodak had a profound influence on the SX-70 design
  - Polaroid's management promised to develop a camera that "would take Kodak years before it could catch up" (Liggero, 2002)

Kodak

- Poured money into developing a competing instant camera and film system
  - No longer was Polaroid's monopoly-through-patents a given
  - It was considered inevitable that Kodak would somehow get around Polaroid's wall of patents and eventually sink the smaller firm in its own pond

The battery

- Before the SX-70, Polaroid cameras had utilized standard batteries. However, batteries running out were a primary source of user frustration. The battery must be in the film pack itself.
  - Was it possible to produce such a battery on mass scale in a cost efficient manner within the specified time frame?
  - The power requirements of the whole camera would have to be substantially reduced. This meant further changes in design.
- In 1968 Polaroid contracted the development of the battery out to ESB.
  - Close to the launch date of the SX-70 in 1972, problems with the battery began coming to light
- The limited launch of the SX-70 in Oct 1972 confirmed these fears:
  - Dying batteries
  - Fumes from the battery were seriously degrading the color quality of the pictures
- ESB was unable or unwilling to fix the problems

Polaroid's reaction

- Polaroid was forced to bring battery manufacturing in-house.
  - For several months, Polaroid deployed its own scientists and engineers in ESB facilities to help solve the battery-film interaction problems
    - After months of trial and error, in 1973 Polaroid was able to start producing its own batteries
    - The gas leakage problem too, was addressed
- By the late 1970s, Polaroid was, by volume, one of the largest battery producers in the U.S. (Olshaker, 1978).

The end of the agreement between Polaroid and Kodak

- Failure of all the previous agreements with Kodak
- Polaroid was forced into the negative film manufacturing (and in the battery market)
- Competition and *wall of patents*
- From high-tech design company to manufacturing company

- Polaroid was so successful and profitable that Kodak **just couldn't keep away** from the instant photography business
  - Kodak made its own version, was sued by Polaroid for huge **patent infringements** and had to leave the market in 1986

Battery difficulties and the crisis

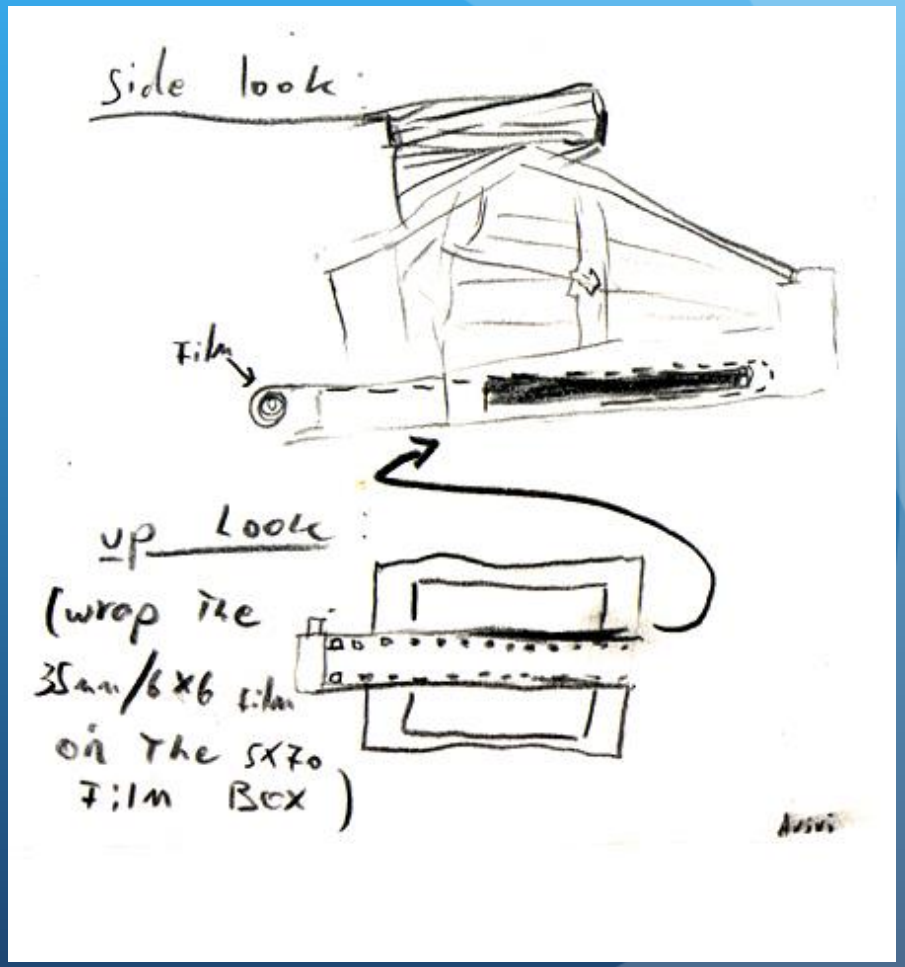
- The position: shifting from camera to film pack for a longer life
- Design changes to reduce the power consumption
- ESB agreement to outsource
- Chemical leakage from ESB batteries
- “Polabeam” manufacturing “in-house”
- Timing of problem solving
- From high-tech design company to manufacturing company

Internalization process

- Polaroid internalized a set of complex production systems
  - Negative manufacturing
  - Batteries manufacturing
- **From high-tech design company to manufacturing company!**

SX-70 Transformation Costs

- MAIN DRIVERS
  - Investments in co-specialized assets
  - Time pressure from Kodak
  - Re-engineering of the design
  - Loss of support from important stakeholders



Sketch reengineering studio of SX-70

Digital photography

- In 1989, more than **40%** of Polaroid's R&D budget was spent on exploring various **digital imaging technologies**!
  - Polaroid **never developed** any **marketing capabilities** for **digital imaging**, nor a new **business model**
  - Technologically speaking, Polaroid was **well prepared** for the shift to digital imaging. It even had a sensor of **1,9 megapixel** in 1989.
  - But in terms of **marketing and business models**, it was never prepared.
    - **Disruptive innovation** is mainly a **business model challenge**!!!

Source: **Christian Sandström** (www.disruptiveinnovation.se)

Internal conflicts: innovation or marketing?

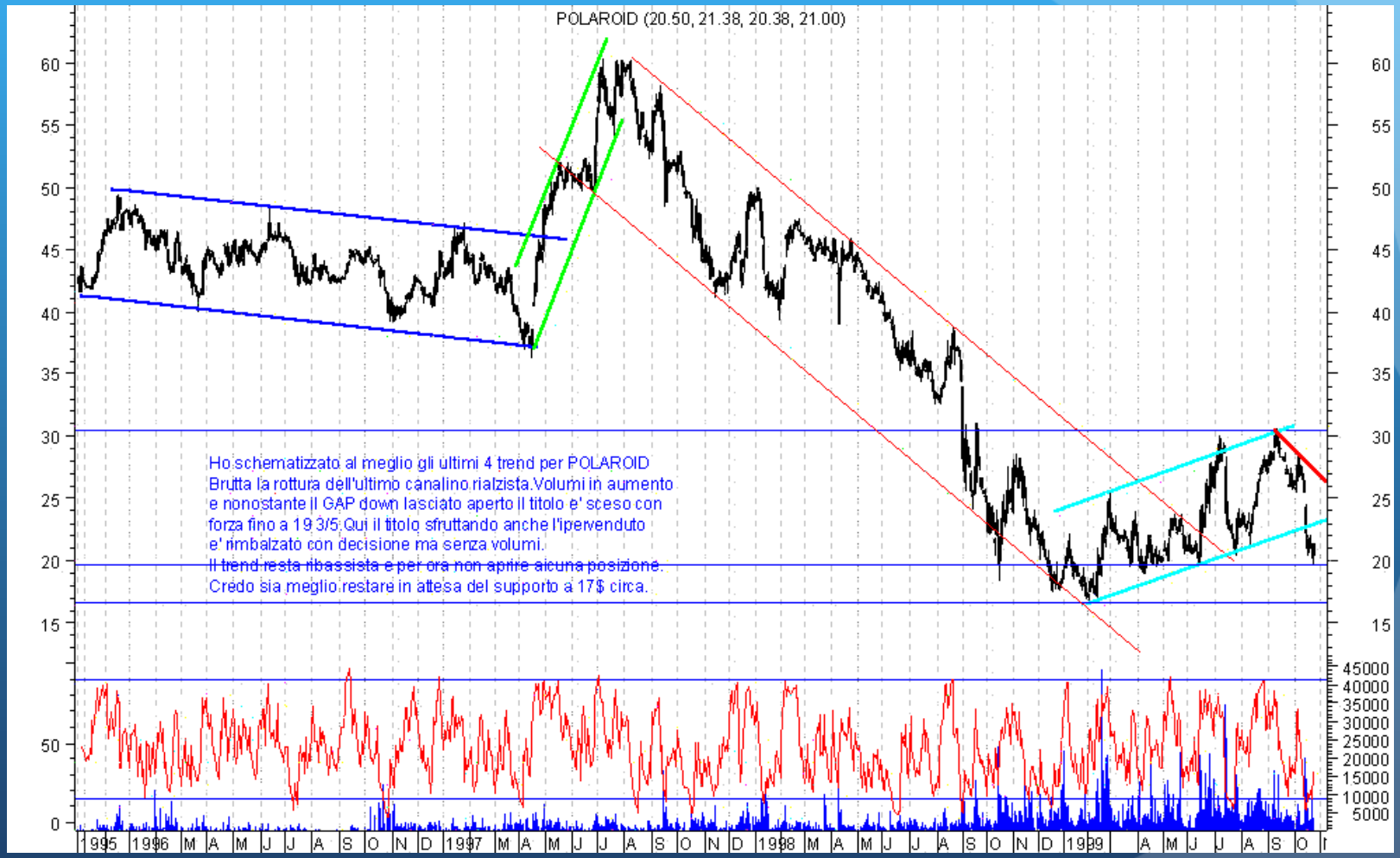
- In the 90's the engineers were in **permanent fights** with senior management over what **business model** to adopt for **digital imaging**
  - Since there was **no film** they thought that there are **no profits**, and therefore digital imaging was **not attractive**
- The conflicts and tensions paralyzed the company
  - The **digital prototype** originally developed in 1992 was not launched until **1996** but they did **not really know** how to sell the product
- In the 1990's Polaroid became **increasingly market oriented** but the new CEO **cut down even more** on technology
  - **More money to marketing**, and **less money to R&D** in 1996-2000

Source: **Christian Sandström** (www.disruptiveinnovation.se)

The results…

- Old wine in new bottles…
  - After all, **more film** was sold, and that's where the **profits** were made
  - But once **digital cameras** were good enough and enabled a kind of **instant photography**, **very few** were interested in **buying expensive** Polaroid film anymore

The end of the story



The end of the story

- In 2001, Polaroid declared bankruptcy. The **disruptive** shift from **analog to digital photography** put this industrial giant out of business.
- After filing for Chapter 11 bankruptcy protection, Polaroid's assets were snapped up by a joint venture led by units of private-equity firms Hilco Consumer Capital and Gordon Brothers Brands for some $90 million in 2009.
- Polaroid now makes consumer electronics, such as plasma TVs and portable DVD players.
- The company's products are sold in supermarkets and specialty stores, by discounters (Wal-Mart), and through its Web site.

What about Kodak?

- Kodak began to struggle financially in the late 1990s as a result of the decline in sales of photographic film and its slowness in transitioning to digital photography. 2007 was the most recent year in which the company made a profit.
- Kodak focused on digital photography and digital printing and attempted to generate revenues through aggressive patent litigation
- In January 2012, Kodak filed for Chapter 11 bankruptcy protection. In February 2012, Kodak announced that it would cease making digital cameras, pocket video cameras and digital picture frames and focus on the corporate digital imaging market.

In recent years, aggressive litigation has become an increasingly important part of Kodak's corporate strategy. Income from patent-suit settlements—including $550 million from Samsung Electronics Co. and more than $400 million from LG Electroni Inc. in the past 12 months—has helped to support Kodak as it struggles to complete the switch from film to digital technologies.

Source:
http://en.wikipedia.org/wiki/Eastman_Kodak
http://online.wsj.com/article/SB10001424052748703757504575194331184972428.html


Eastman Kodak Co. (EKDKQ) - OTC Markets
Aggiungi al portafoglio
Mi piace
0,0491
0,0059 (10.73%)
7:19PM GMT+02:00
Azienda o codice
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Thank you for the attention