



# 2009

Pre-Dinner

## Invited Speaker

### ARCHIVE 2009

#### **BiTS AND PIECES— PAST, PRESENT AND FUTURE**

by

**Dr. James Forster**

Chief Technical Officer

Antares Advanced Test Technologies

#### **ABSTRACT**

**T**he BiTS Workshop is the world's premier event dedicated to providing a forum for the latest information about test and burn-in socketing and related fields. It has become the annual event for those involved in the “backend” of semiconductor processing and draws attendees and exhibitors from around the world for learning and networking. The workshop has been held in the Phoenix area since its inception in 2000.

This year represents a significant milestone as the workshop celebrates its 10th meeting. During the history of BiTS we have experienced good food, good company and excellent and perceptive presentations. While all the presentations are available on the BiTS website, perhaps the 10th anniversary is a good time to take a little time to reflect on some of the previous presentations.

The BiTS Workshop's archives are a tremendous source of information. This presentation will re-examine some of the presentations from the previous 9 workshops. Specific papers will be highlighted and some “sense” and “perspective” given – the past presentations will be dusted-off and a light shone into this library of information.

After looking backward, a look forward will examine packaging trends and the potential issues the audience will have to face in the coming years.

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# BiTs and Pieces

## – Past Present and Future

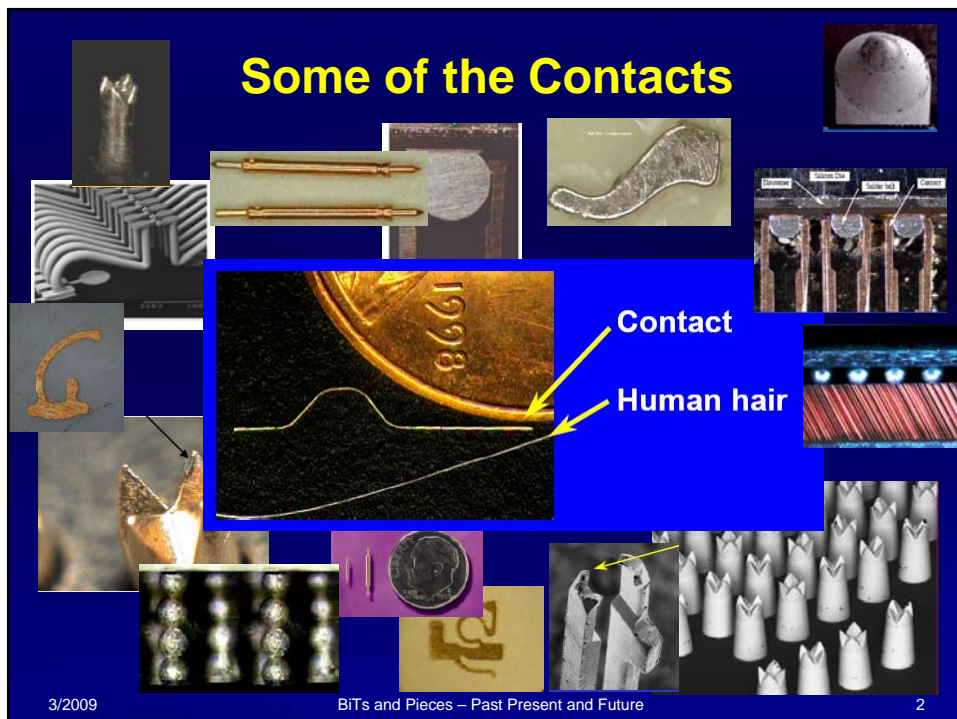
**Dr James Forster,**  
**CTO, Antares-Advanced Test Technologies**



**2009 BiTS Workshop**  
**March 8 - 11, 2009**

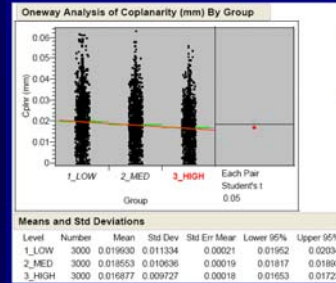


## Some of the Contacts



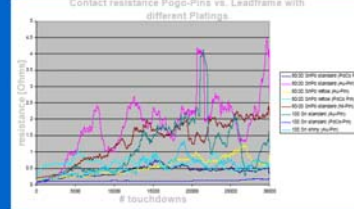
## Some of the Data

### Device Coplanarity

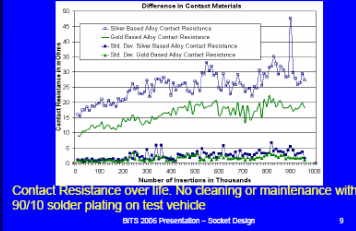


- ▶ Laser scan data analyzed statistically
- ▶ No adverse impact

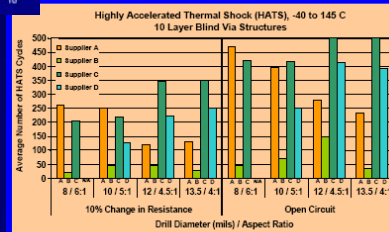
### Life Cycle Resistance Study



### Contact Plating and Composition



### Reliability: Blind Via HATS



Supplier B: Earliest Thermal Shock Failure<sup>24</sup>

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## Agenda / Outline

- The 10<sup>th</sup> anniversary of BiTS my presentation will be .....
  - Whimsical
  - Fun look back
  - Fun look forward
  - Interesting and amusing
- Assumptions
  - We are all geeks
  - Dilbert makes sense to us

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## Agenda / Outline

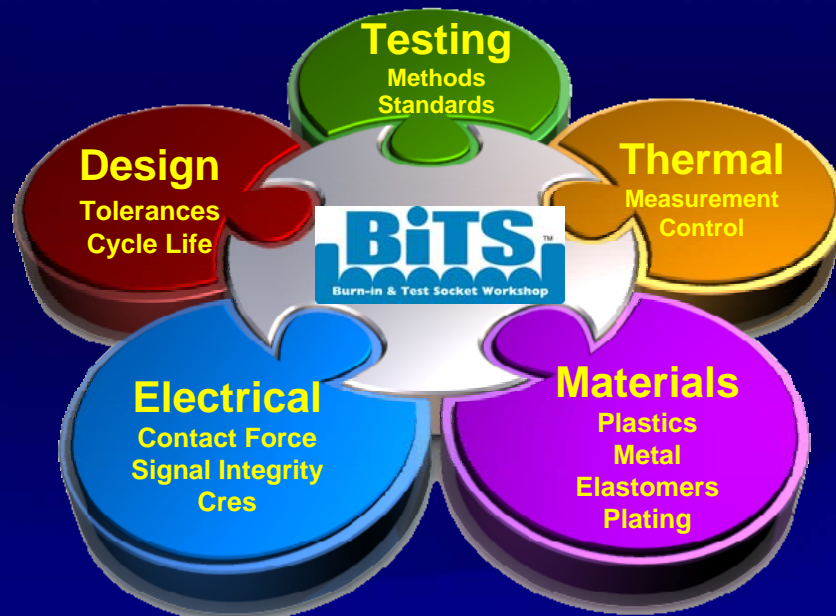


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## What is the BiTs Workshop



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## Some Numbers .....Some Data .....Some Statistics



**222 Presentations**  
**2834 Participants**  
**337 Exhibitors**

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## Some More Numbers .....

**45% of All Presentations**



**22**



**21**



**14**



**13**



**10**



**10**



**9**

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## Some More Numbers .....

### The pop stars of BiTS

Some give more/present more than others –

#### 6 Presentations

John Diller; Synergetics  
04, 05, 06, 07, 08, 08

Frank Zhou; KnS, Antares  
02, 03, 04, 05, 07, 08

#### 5 Presentations

Valts Treibergs; Everett Charles Technologies  
00, 01, 02, 04, 07,

Jeff Sherry; Johnstech  
02, 02, 02, 06, 07,

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## Some More Numbers .....

### The Shortest - 2000

"Burn-in Board Design Considerations"  
Tony Valente - Unisys – Unigen  
6 slides including the title page



### The Longest – 2001

"Cost Effective Burn-in Board Design"  
Frank W. Jurasek, Ralph J. Bernardini,  
James M. Brown, IBM Microelectronics  
51 slides



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**Lets take a look back at those  
formative years.....**

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## **In the Beginning**



### **BiTS Committee 2000**

- **Bill Mann (IEEE), Paul Boyce (Motorola), Ariane Loranger (Loranger International), Valts Treibergs (PrimeYield Systems), John Ambrosini (Enplas-Tesco), Fred Taber (IBM), Wray Johnson (Texas Instruments), Rafiq Hussain (AMD)**

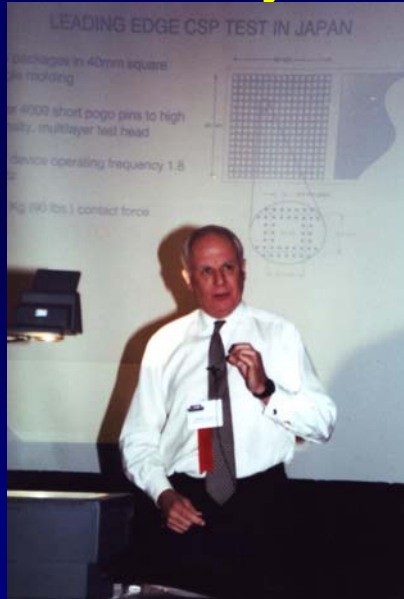
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## The Keynote Speaker Was .....



**Charles Lassen**  
- Prismark Partners LLC  
"Test Access to Today's  
Leading Packages"

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## Another Speaker Was .....



**Pamela Lohr**  
- Johnstech International  
"Interface Considerations  
For High Performance  
Contactors In Automated  
Test Environments"

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## But First There Was .....

### 1996 An idea – John Hartstein

Bring in key customers and give them insight into our engineering capabilities our facilities and share knowledge about socket design, materials.

### 1997 May “Wells Burn-in Socket Symposium” South Bend, Indiana

#### Program :

Kick Off Dinner	Johnny Lattner - Heisman Trophy Winner - University of Notre Dame
Valts Treibergs	Socket Overview
Kevin Young	The Contact Spring Member - Physics
Lee Palmer	Contact Materials and Material Properties
Max Peel	Failure Modes, Functional Interrelationships, and Test Sequences
Dr. Mort Antler	Metallic Finishes and Other Coatings for Separable Electronic Connector Contacts
Chung Namgung	PCB Manufacturability, Laminate Material, Final Metal Finish and Micro Vias
Jim Ostendorf	History of Burn-in Boards, Electrical and Mechanical Limitations, and Market Directions

#### Attendees included

**Micron, IBM, AMD, TI, Motorola, Dynavision, Siemens (then Infineon, now Qimonda)**

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## And of course .....



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## And then .....

1998 May, San Jose, Ca  
2nd "Wells Burn-in Socket Symposium"

At the end of Symposium #2



Fred Taber (IBM) and Don Noble (TI) advocated that this become an open forum where other socket vendors and other burn-in suppliers could present so that everyone got a chance to discuss the new technologies and developments in the market.

And the rest is history .....



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## So When Was 2000 ..... A little perspective 2000 was the first BiTS Workshop...

**BURN-IN & TEST  
SOCKET WORKSHOP**

**2000**

**IEEE**

CALL FOR PAPERS

WORKSHOP INFORMATION

HOTEL INFORMATION

COMMITTEE ROSTER

LIBRS

BiTS HOMEPAGE

**IEEE COMPUTER SOCIETY**

**WELCOME TO BiTS! 2000**

Date: February 27-29, 2000

Location: Hilton Mesa Pavilion Hotel, Mesa, Arizona

Participate in the rapid changes in your industry! Join us for the inaugural workshop directed at burn-in and test sockets. Attendees of the workshop will include socket manufacturers and users, package designers and material manufacturers.

To promptly deliver reliable packaged electronics devices to customers depends on successfully performing burn-in and test operations. As IC packages continue to get smaller and their I/O more densely populated, it becomes all the more critical that socket users ensure they have reliable sockets delivered in a timely fashion.

Socket designs are rapidly and continuously evolving in fascinating ways to keep ahead of the burn-in and test requirements of a wide-ranging set of new IC packages. This in turn requires socket suppliers and users to make complex, technical decisions under tight deadlines. At the BiTS Workshop you'll have the opportunity to learn from and exchange ideas with other socket professionals, to assist in making those decisions.

BiTS Burn-in & Test Socket Workshop

Page last revised 08/11/99

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## 2000 Was .....

On February 4<sup>th</sup> in China it was the first  
day of the Golden Dragon 4697



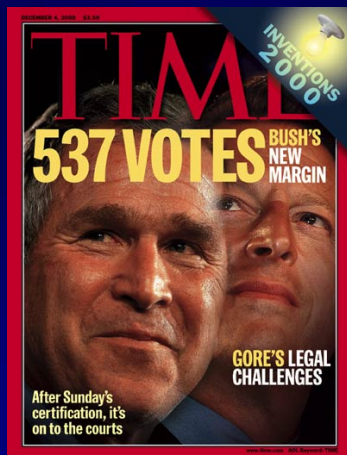
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## 2000 Was .....

An election year in America



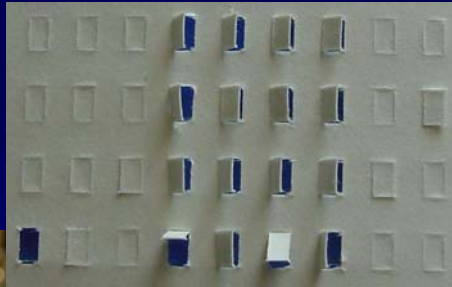
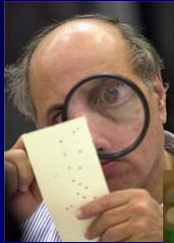
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## 2000 Was .....

The year America tried to understand how  
votes are counted and learned about  
“hanging chads”

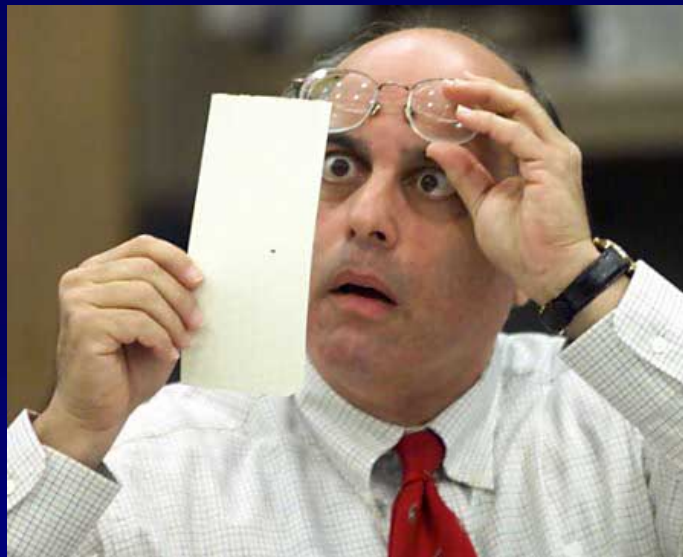


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## 2000 Was .....



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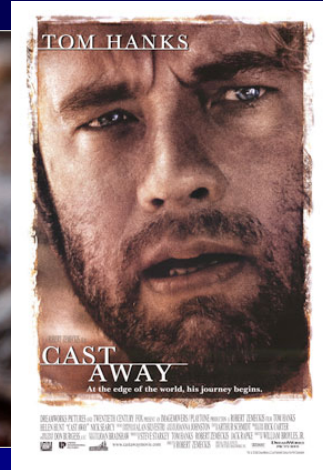
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## 2000 Was .....

The year the world learned about a friend  
called Wilson and



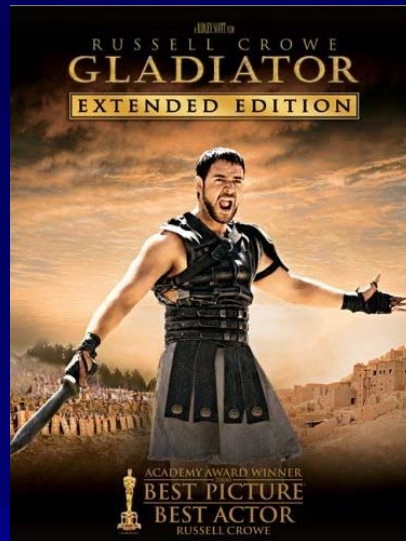
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## 2000 Was .....

Maximus a gladiator

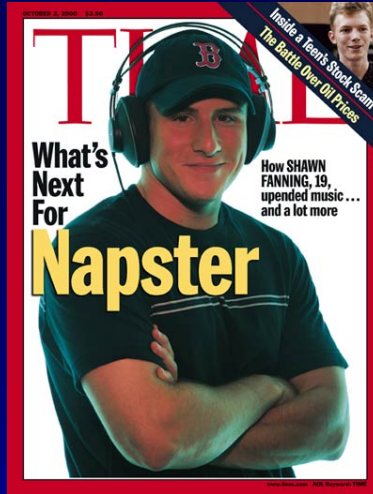


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**October 2000 Was .....  
Introduction to file sharing and  
Napster**



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**2000 Was .....  
The year we re-entered space**



**November 21, 2000 International Space station occupied**

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## 2000 Was .....



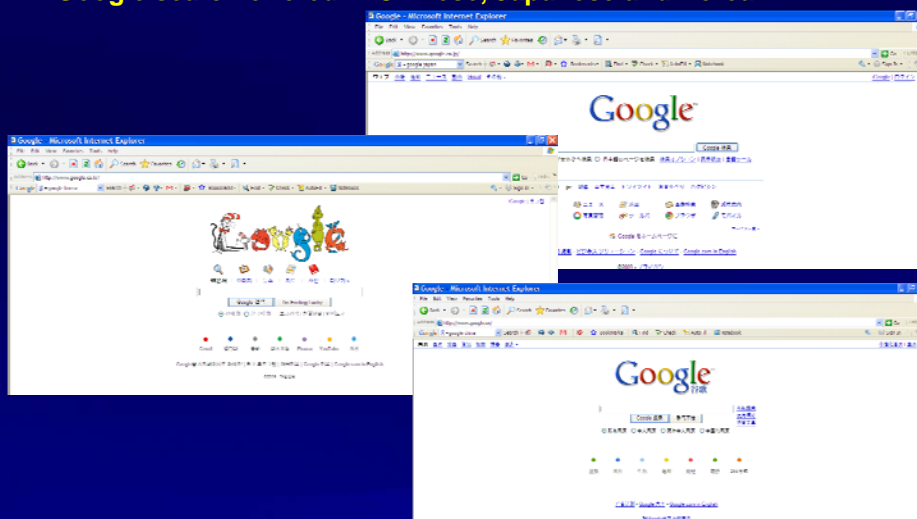
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## 2000 Was .....

**Google toolbar released**  
**Google search offered in Chinese, Japanese and Korean**



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## From Then Till Now Some Comparisons 2000 - 2009

	2000	2009
World Pop (Billion)	6.070	6.710
March 6 <sup>th</sup> DOW	9856	6626
NASDAQ	4897	1294
Internet Usage Asia	114 M	650 M
Rest of World	247 M	924 M
(USA) Cell Phone Subscribers	97 M	262.7 M (84% of pop)
Annual minutes of use	195 B	2.23 Trillion
Monthly # of SMS Messages	12.2 M	75 billion



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## Looking Forward

### International Technology Roadmap for Semiconductors

Table TST15a Test Socket Technology Requirements—Near-term Years									
Year of Production	2007	2008	2009	2010	2011	2012	2013	2014	2015
TSP—Flash (NAND)—Contact blade [1]									
Commodity NAND Memory									
Lead Pitch (mm)	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Data rate (MT/s)	60	60	60	66	66	100	100	100	100
Contact blade									
Inductance (nH)	10-16	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10
Contact Stroke (mm)	0.3-0.6	0.3-0.5	0.3-0.5	0.3-0.5	0.3-0.5	0.3-0.5	0.3-0.5	0.3-0.5	0.3-0.5
Contact force (N)	0.2-0.4	0.2-0.3	0.2-0.3	0.2-0.3	0.2-0.3	0.2-0.3	0.2-0.3	0.2-0.3	0.2-0.3
Conta									
Blk or BGA									
Conta									
Year of Production	2016	2017	2018	2019	2020	2021	2022		
BGA—SoC—Spring Probe (50 Ohm) [3]									
Logic (High volume microprocessor)									
Lead Pitch (mm)	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
I/O data (GT/s)	20	20	20	40	40	40	40		
Spring Probe (50 Ohm)									
Impedance (Ohm)	50	50	50	50	50	50	50		
Contact Stroke (mm)	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
Contact force (N)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
Contact resistance (m Ohm)	50	50	50	50	50	50	50		
Spring Probe (50 Ohm)									
Inductance (nH)	0.16	0.16	0.16	0.16	0.16	0.16	0.16		
Contact Stroke (mm)	0.16	0.16	0.16	0.16	0.16	0.16	0.16		
Contact force (N)	0.2	0.2	0.2	0.16	0.16	0.16	0.16		
Contact resistance (m Ohm)	60	60	60	60	60	60	60		
Thickness (mm)	0.6	0.6	0.6	0.6	0.6	0.6	0.6		

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## The Future Looking back to see the future - 1966

Reality

Science Fiction



State of the art

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## The Future



1994



1996



2009



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## The Future Looking back to see the future - 1966

### Reality



The water-bag B-mode scanning system, the SSD-1, from Aloka in 1960

### Science Fiction



### State of the art

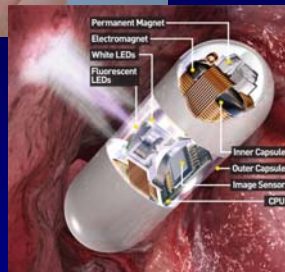
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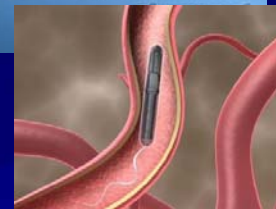
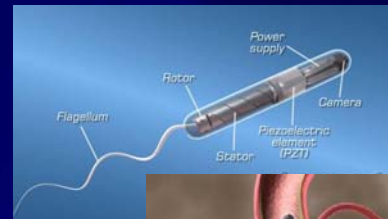
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## The Future

**2004**



**2009**



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**The Future..... 2015 2020**

**?**

**We can dream and imagine**

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## **Acknowledgments**

- **Everyone:-**
  - You and the previous the 2834 participants
  - The 222+ authors and presentations.
- **But Especially**
  - Fred Taber and his team.

**Thank you.**

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## Our Thanks



2000



2008

**Years of dedicated effort**

**Fred Taber**

**Rafiq Hussain**

**Valts Treibergs**

**Paul Boyce**

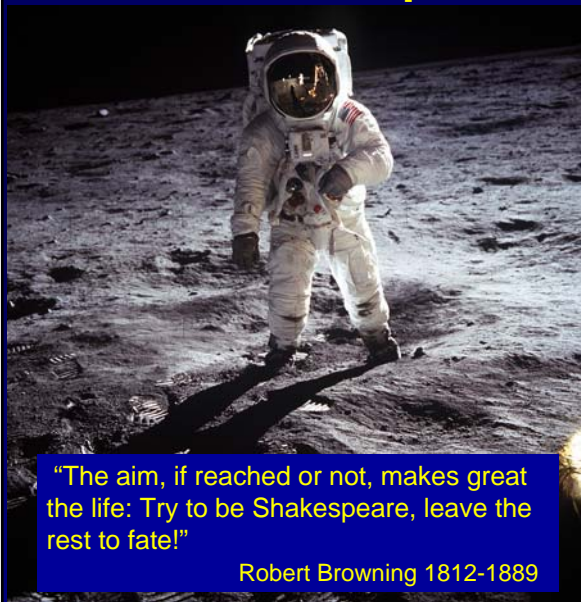
**And others**

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## A Personal Perspective - 40 Years Ago



**July 21, 1969**

≈ 2 ½ Hrs spent on  
the surface of the  
moon

"The aim, if reached or not, makes great  
the life: Try to be Shakespeare, leave the  
rest to fate!"

Robert Browning 1812-1889

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"Ah, but a man's reach should exceed his grasp, or  
what's a heaven for?"

Robert Browning 1812-1889

