

# Design and System Drivers

## More than Moore Session

### Worldwide Design ITWG

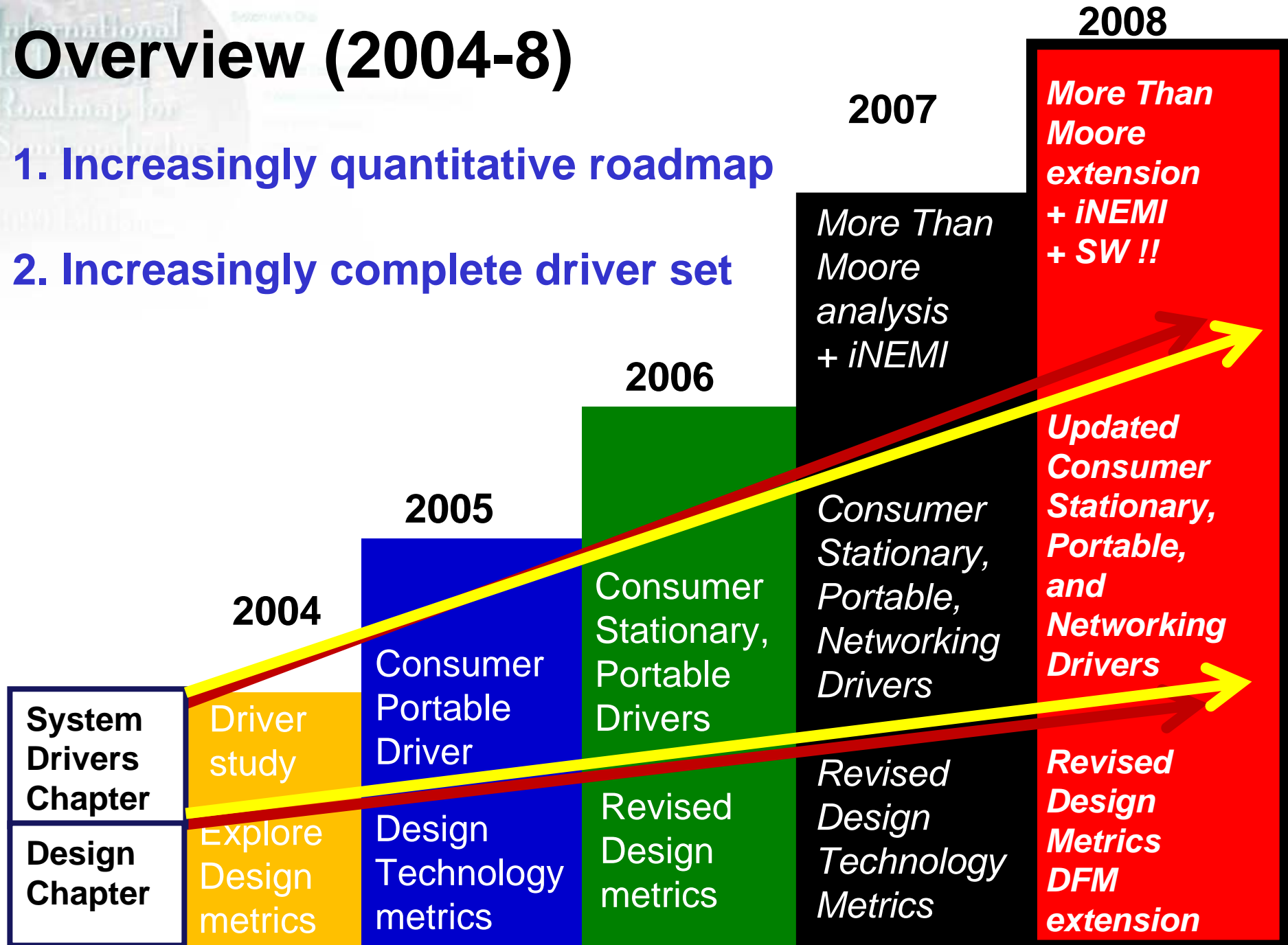
J.A. Carballo, T. Hiwatashi, A.B. Kahng, H. Kashiwagi  
S. Rawat, W. Rosenstiel, G. Smith

### Key messages:

- 1.- Software is now an integral part of semiconductor products
- 2.- Design increasingly enables **viable** technology control reqts
- 3.- Design technology pacing largely unaffected by HP GL shift
- 4.- Key system drivers updated in 2008 (MPU, Consumer P/S)**
- 5.- MtM brings a new set of Design requirements/solutions**
- 6.- MtM brings a new set of System Drivers' parameters**
- 7.- Will continue to broaden System Drivers based on markets**

# Overview (2004-8)

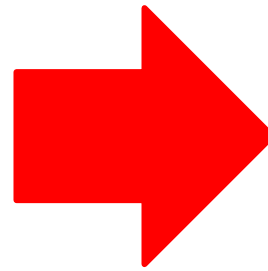
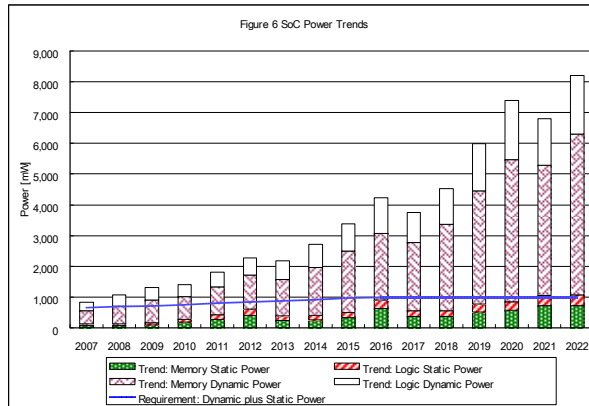
1. Increasingly quantitative roadmap
2. Increasingly complete driver set



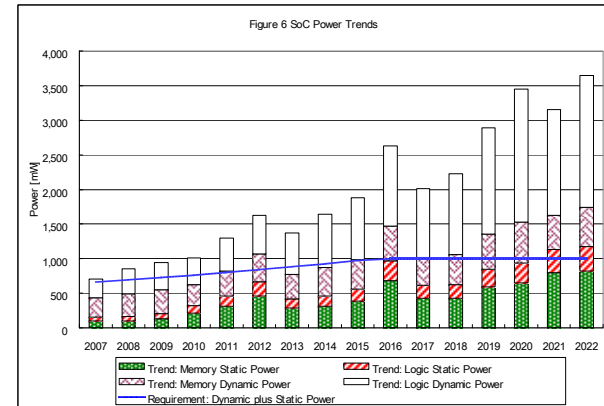
# Updated Consumer Driver Model

- Updated power modeling to reflect realistic dynamic power
  - Memory dynamic power 10X less than modeled previously

**8 W** max total (2022)



**3.5 W** max total (2022)



- Will identify key driver requirements, explore coloring
  - E.g., excessive power beyond portable limit (1 W)
- Will explore RF/analog/MS for future portable consumer drivers
  - Possibly a new “wireless” driver, or extension of existing driver
- Will explore additional parameters per Test/A&P requests
  - Upon provision of rationale/definition: Clocks, I/Os, currents, etc.

# More Than Moore (Design)

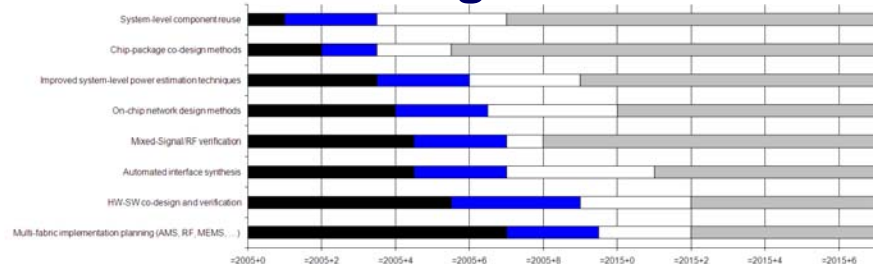
- More than Moore brings a new set of requirements/solutions
  - Will create additional inventory of parameters

Existing

## Existing requirements

Table ID	Year of Production	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Technology Node		90nm	65nm	45nm	32nm	28nm	20nm	16nm	14nm	12nm	10nm	7nm	5nm	3nm	2nm	1.8nm	1.4nm
<b>Design Reuse</b>																	
2	Design block reuse % to all logic size	32%	33%	35%	36%	38%	40%	41%	42%	44%	45%	46%	49%	51%	52%	54%	55%
<b>Platform Based Design</b>																	
3	Available platforms Normalized to 100% sub-architecture	52%	51%	67%	63%	75%	70%	80%	85%	92%	88%	83%	83%	80%	77%	75%	72%
4	Platforms supported % of platforms fully supported/usable	3%	6%	10%	22%	35%	50%	57%	64%	70%	80%	82%	80%	82%	84%	85%	87%
<b>High Level Synthesis</b>																	
5	Factorial of high-level schemata (performance, area, power, costs)	% vs. measurements	53%	56%	58%	62%	66%	70%	72%	74%	80%	83%	86%	90%	92%	94%	95%
<b>Reconfigurability</b>																	
6	FCC reconfigurable % of FCC available	23%	26%	28%	29%	30%	35%	38%	40%	42%	45%	48%	50%	52%	56%	60%	62%
<b>Analog Mixed Signal</b>																	
7	Analog automation % vs. digital automation	12%	14%	17%	17%	24%	24%	27%	30%	32%	35%	38%	40%	43%	46%	50%	52%
8	Modeling methodology, description languages, and simulation environments	% vs. digital methodology	53%	55%	58%	60%	62%	65%	67%	70%	73%	75%	78%	80%	83%	85%	87%

## Existing solutions

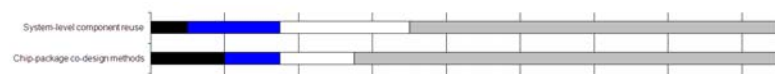


Additional

## Additional requirements

Requirement	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1. RF support for logic and other circuit types (on-chip)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2. RF support for performance characterization and measurement	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3. RF model on system performance (noise, parasitics, nonlinearity, etc.)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

## Additional solutions



E.g.

- System-level (packaging)
- Circuit (inter-chip parasitics modeling/simulation)
- Layout (SiP global layout)
- DFM (package-chip, SiP DFM)

# More Than Moore (System Drivers)

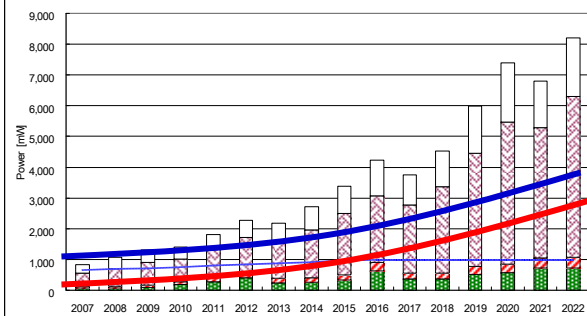
- More than Moore brings an alternative set of parameters
  - Will create additional inventory of parameters

Current scenario

Additional scenario

System Drivers

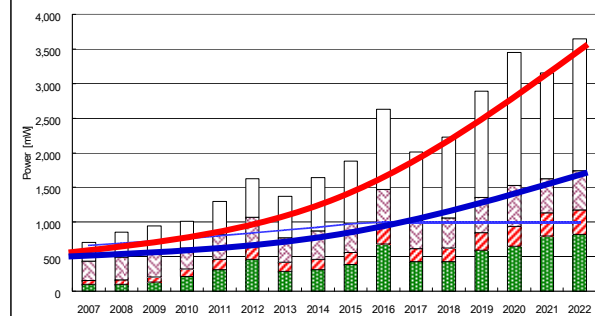
### Consumer portable (SoC)



Power

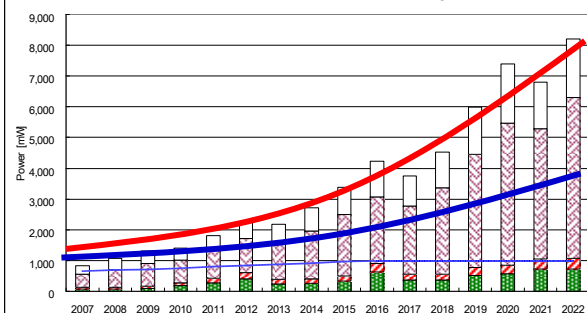
Normalized Cost

### Consumer portable (SiP scenario)



System Drivers

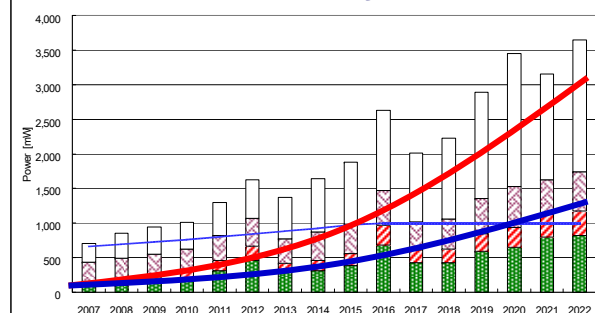
### Consumer stationary (SoC)



Performance

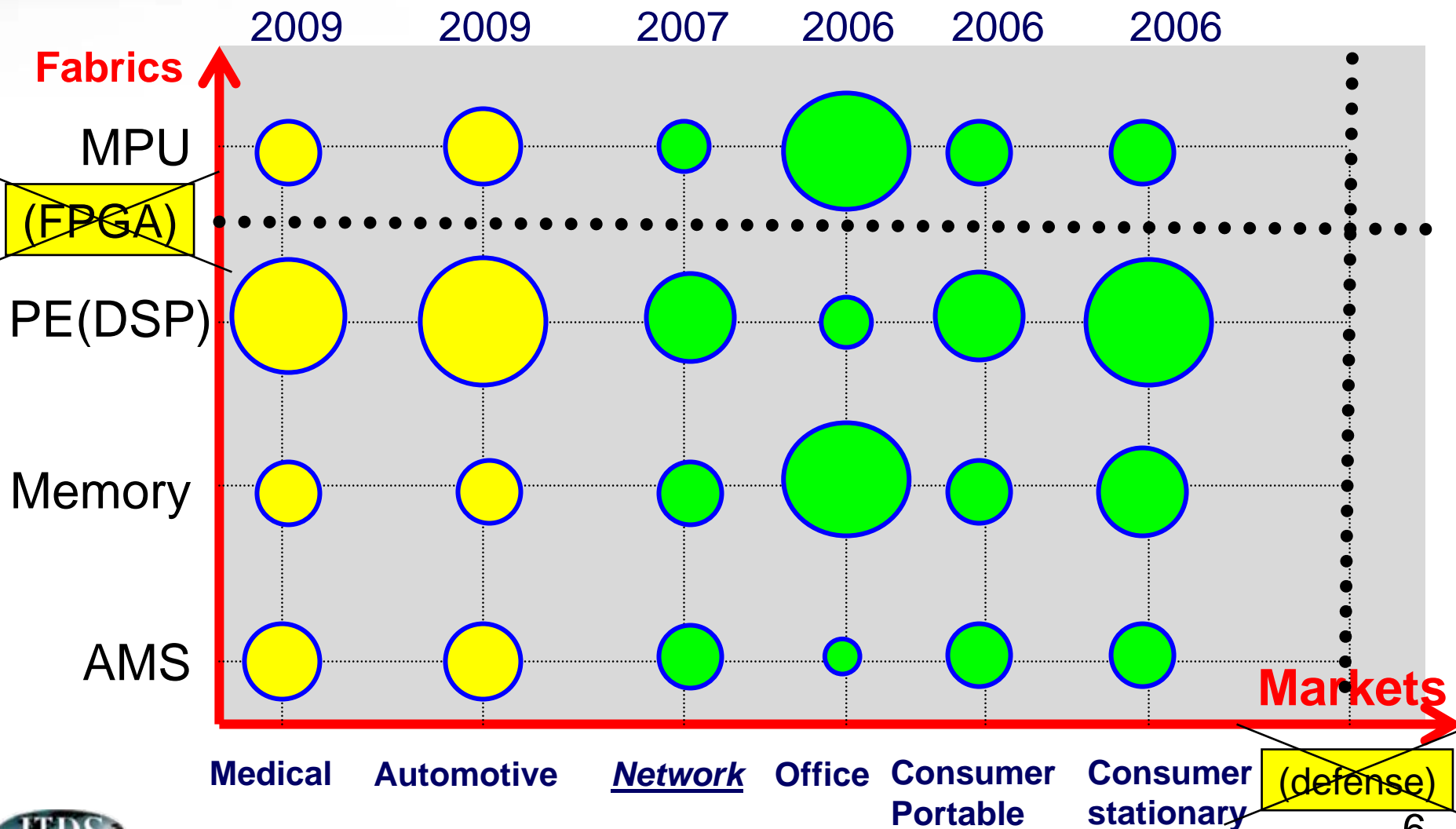
Normalized Cost

### Consumer stationary (SiP scenario)



# Other System Drivers

- New FPGA driver suspended (until resource identified)
- Others (defense) eliminated to synchronize with latest iNEMI



# System Drivers and iNEMI

Proposal to iNEMI: iNEMI develops Portable System Arch. Template

**Need commitment including designer resource**

