

Building a Road Map for Innovation: Strategic Clinical Technology Investment

Hong Kong Hospital Authority Convention 2008



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Vice President, Sg2

5 May 2008

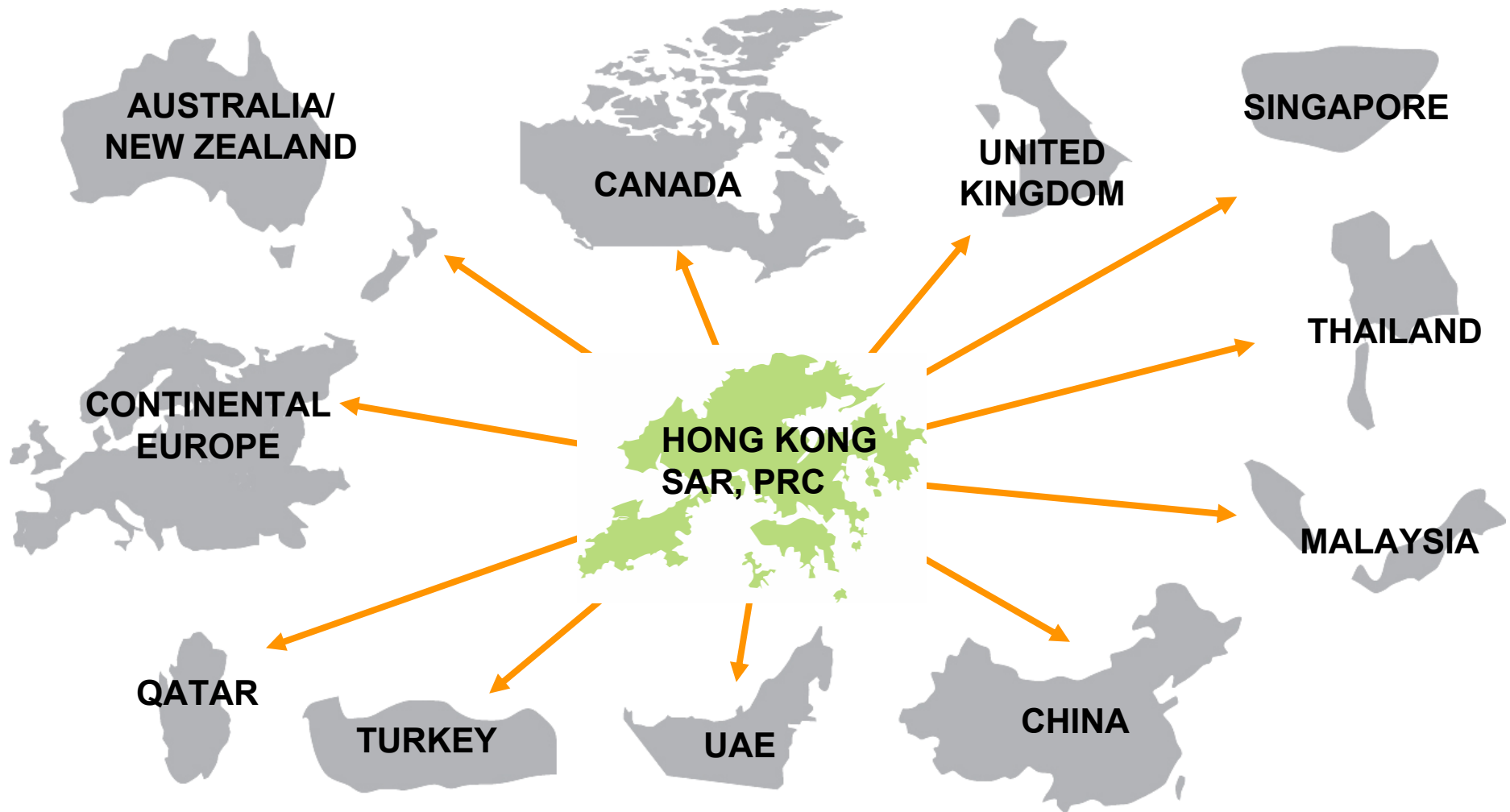
Agenda

Global Strategic Challenges in Health Care

Clinical Technologies Transforming Medicine

Building Road Maps for Innovation

All Corners of the World Face Similar Strategic Challenges



Demographic Transformation Creates New Needs and Wants...

	2006 Population	2005 Demographic Indicators			2025 Demographic Indicators		
		Growth (%)	Life Expect at Birth (Y)	Infant Mort/ 1,000 Live Births	Growth (%)	Life Expect at Birth (Y)	Infant Mort/ 1,000 Live Births
Philippines	90,780,000	1.8	69.9	24	1.2	75.2	13
Malaysia	26,900,000	1.8	72.2	18	1.4	76.9	10
Cambodia	14,071,000	1.8	58.9	71	1.4	66.5	38
India	1,124,400,000	1.7	67.2	40	1.2	77.8	10
Singapore	4,483,900	1.6	81.6	2	0.2	83.1	2
Indonesia	234,200,000	1.3	69.6	34	0.8	74.9	17
Sri Lanka	20,905,000	1.2	74.5	20	0.5	78.2	11
Vietnam	85,060,000	1.0	70.6	26	0.6	75.6	14
US	301,300,000	0.9	77.7	6	0.8	80.5	5
N Korea	23,250,000	0.9	71.4	24	0.4	76.3	13
Australia	20,780,000	0.9	80.4	5	0.5	82.3	4
Myanmar	50,519,000	0.8	61.6	54	0.4	68.9	29
Thailand	64,990,000	0.7	72.0	20	0.2	76.6	11
PRC	1,316,500,000	0.6	72.3	24	0.2	77.2	11
Taiwan	23,155,000	0.6	77.3	6	0.1	80.3	5
S Korea	49,024,737	0.4	76.8	6	0.0	80.1	5
UK	60,541,000	0.3	78.4	5	0.2	80.1	4

Sources: <http://www.census.gov/ipc/www/popclockworld.html>; Sg2 Analysis, 2008.

...Which Will Be Addressed by Strategic Investment in Clinical Technologies

	GDP/PPP (2006 Estimated Millions Standard International \$ Weights)	GDP/PPP per Capita	Real Growth Rate (%)	Health Care Expenditure per Capita (PPP\$)	Public Health Expenditure (% of GDP)	Total Health Care Expenditure (% of GDP)
Philippines	453,000	5,100	5.1		1.4	
Malaysia	290,200	21,100	5.3	152		3.7
Cambodia	30,650	2,200	6.0			
India	3,611,000	3,300	7.6	82	1.2	2.6
Singapore	124,300	28,100	6.4	1,156	1.6	4.2
Indonesia	856,600	3,600	5.6		1.1	
Sri Lanka	85,340	4,300	5.6		1.6	
Vietnam	232,200	2,800	8.4		1.5	
US	12,360,000	41,800	3.5	5,711	6.8	13.9
N Korea	40,000	1,700	1.0			
Australia	640,100	31,900	2.5	2,874	6.4	9.3
Myanmar	78,740	1,700	2.9	51	0.5	3.3
Thailand	560,700	8,300	4.5			3.3
PRC	8,859,000	6,800	9.9	278		4.1
Taiwan	631,200	27,600	3.8			6.2
S Korea	965,300	20,400	3.9			5.6
UK	1,830,000	30,300	1.8	2,389	6.9	7.9

Sources: The World Factbook, CIA, 2006; <http://www.infoplease.com/ipa/A0874911.html>; Human Development Report, 2006, United Nations; <http://www.infoplease.com/ipa>; Sg2 Analysis, 2008.

Acute Diseases Pose Global Health Threats, But Chronic Illnesses Are the Next Pandemic

For better or for worse, urbanisation and industrialisation are shaping the future threats to worldwide health.

Relative risk factors for cardiovascular disease in males >65 years old

Country	Mean Total Cholesterol (mmol/l*)	Hypertension Prevalence (>19/12 kPa [†])	Diabetes Prevalence	Smoking Prevalence	BMI >25 Prevalence
US	5.1	41.4%	19.2%	8.6%	76.1%
UK	5.7	66.6%	11.9%	17.0%	77.3%
Germany	6.3	56.0%	12.7%	22.6%	81.0%
France	5.9	80.5%	N/A	10.3%	N/A
Japan	5.1	55.6%	29.4%	34.8%	30.1%
China	5.4	58.9%	5.1%	42.0%	22.7%
India	4.6	55.6%	28.5%	63.9%	24.8%

*mmol/l x 39 = mg/dl cholesterol.

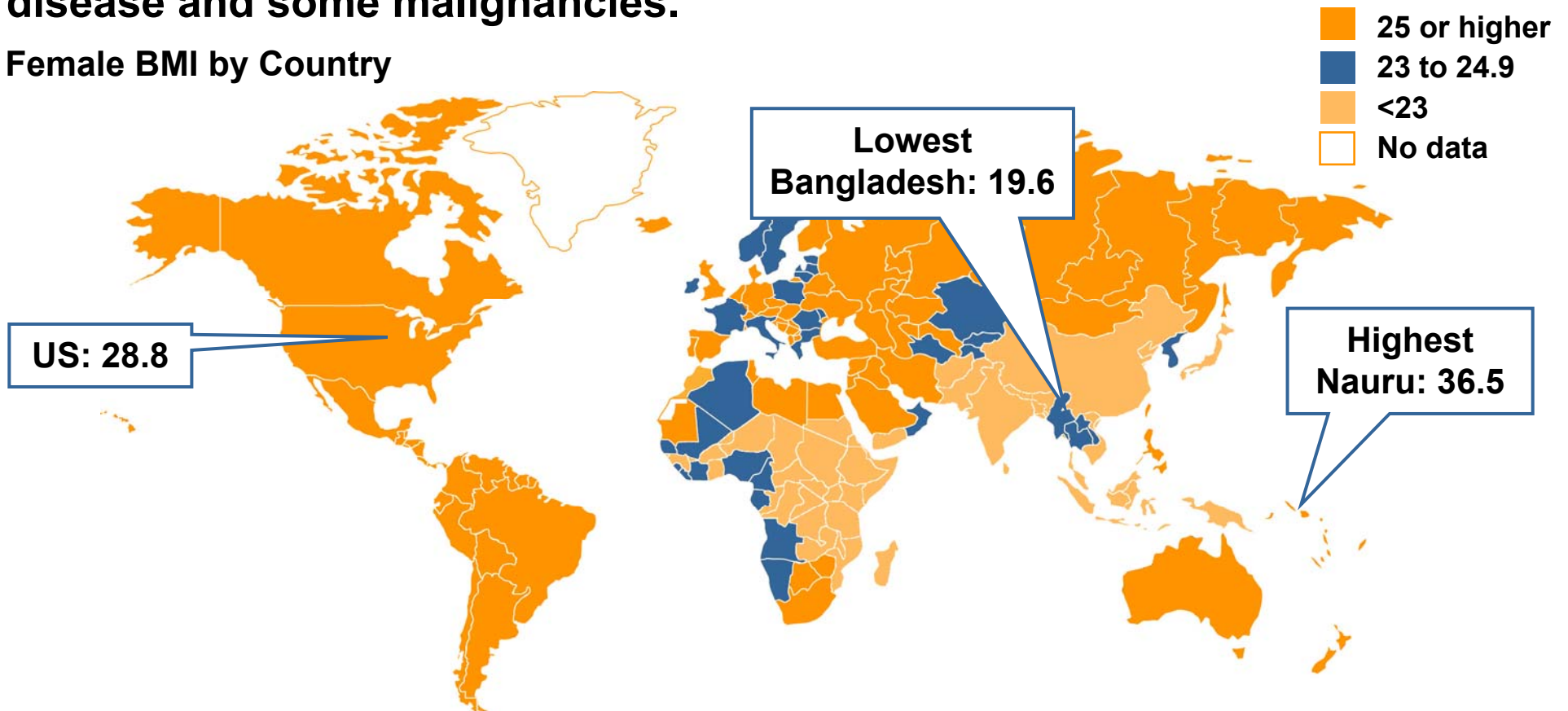
[†]140/90 mmHg = 19/12 kPa.

Sources: WHO Global InfoBase Online; World Bank Group; The World Factbook, CIA; Sg2 Analysis, 2007.

Will the Pacific Rim Migrate to the Sedentary Lifestyle and Rampant Obesity of the West?

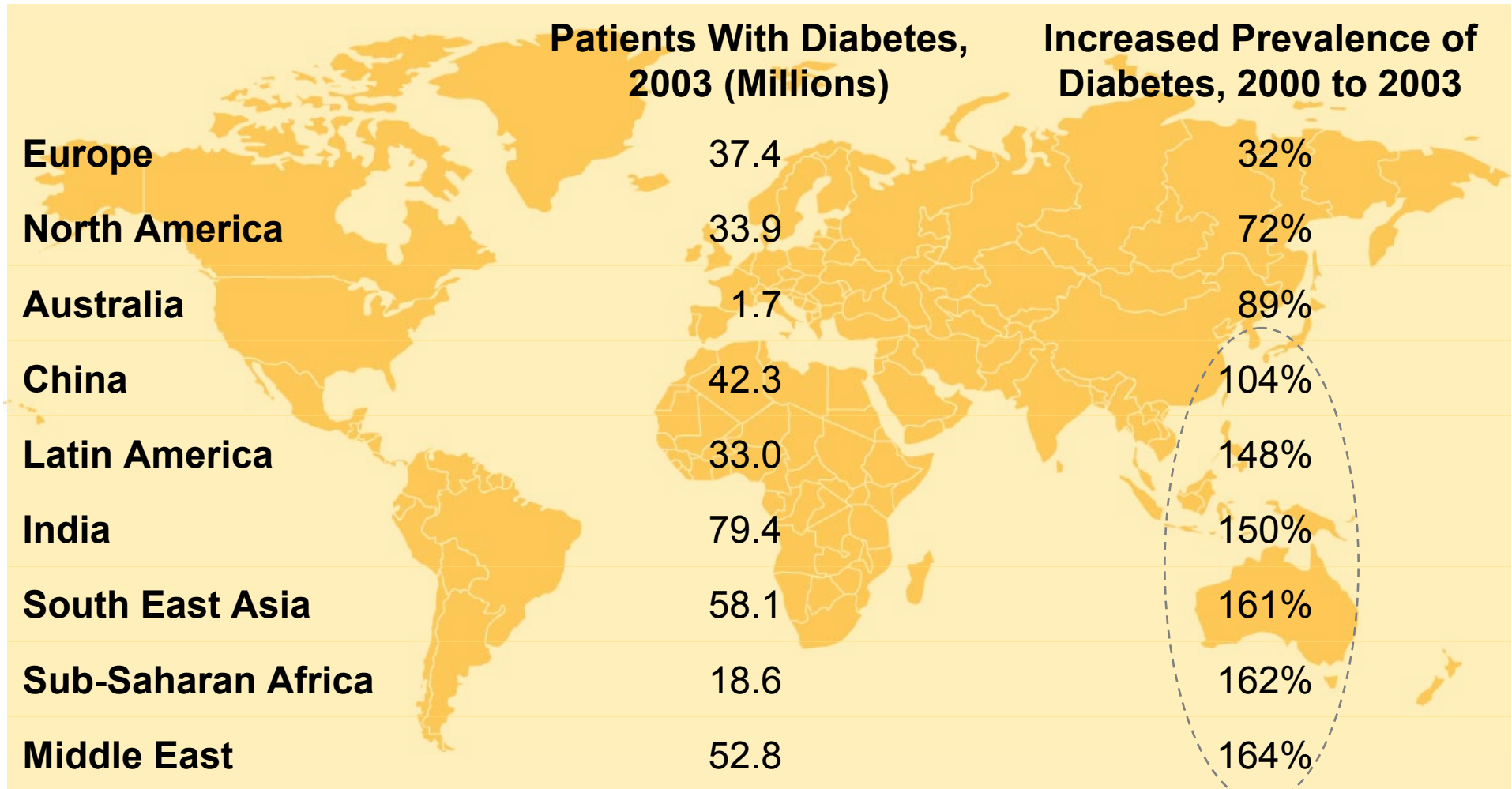
Obesity impacts incidences of cardiovascular disease, musculoskeletal disease and some malignancies.

Female BMI by Country



Sources: Jones S. Fashion world asks: How thin is too thin? *Chicago Tribune* 4 Feb 2007; Hossain P et al. *N Engl J Med* 2007;356:213-215; Sg2 Analysis, 2008.

... With Implications for the Global Burden of Diabetes, Vascular and Renal Diseases



Sources: Jones S. Fashion world asks: How thin is too thin? *Chicago Tribune* 4 Feb 2007; Hossain P et al. *N Engl J Med* 2007;356:213-215; Sg2 Analysis, 2008.

Hospital Authority Convention 2007— Innovating for Health



**Dr York Chow, Secretary for Health, Welfare and Food, Hong Kong
Special Administrative Region, 7 May 2007**

- Successful technologic innovation must:
 - Drive better health care outcomes and increased patient satisfaction
 - Result in broad application and scalability
 - Create affordable and sustainable opportunities

**Value Creation
Equitable and Accessible Care
Sustainable Competitive Advantage**

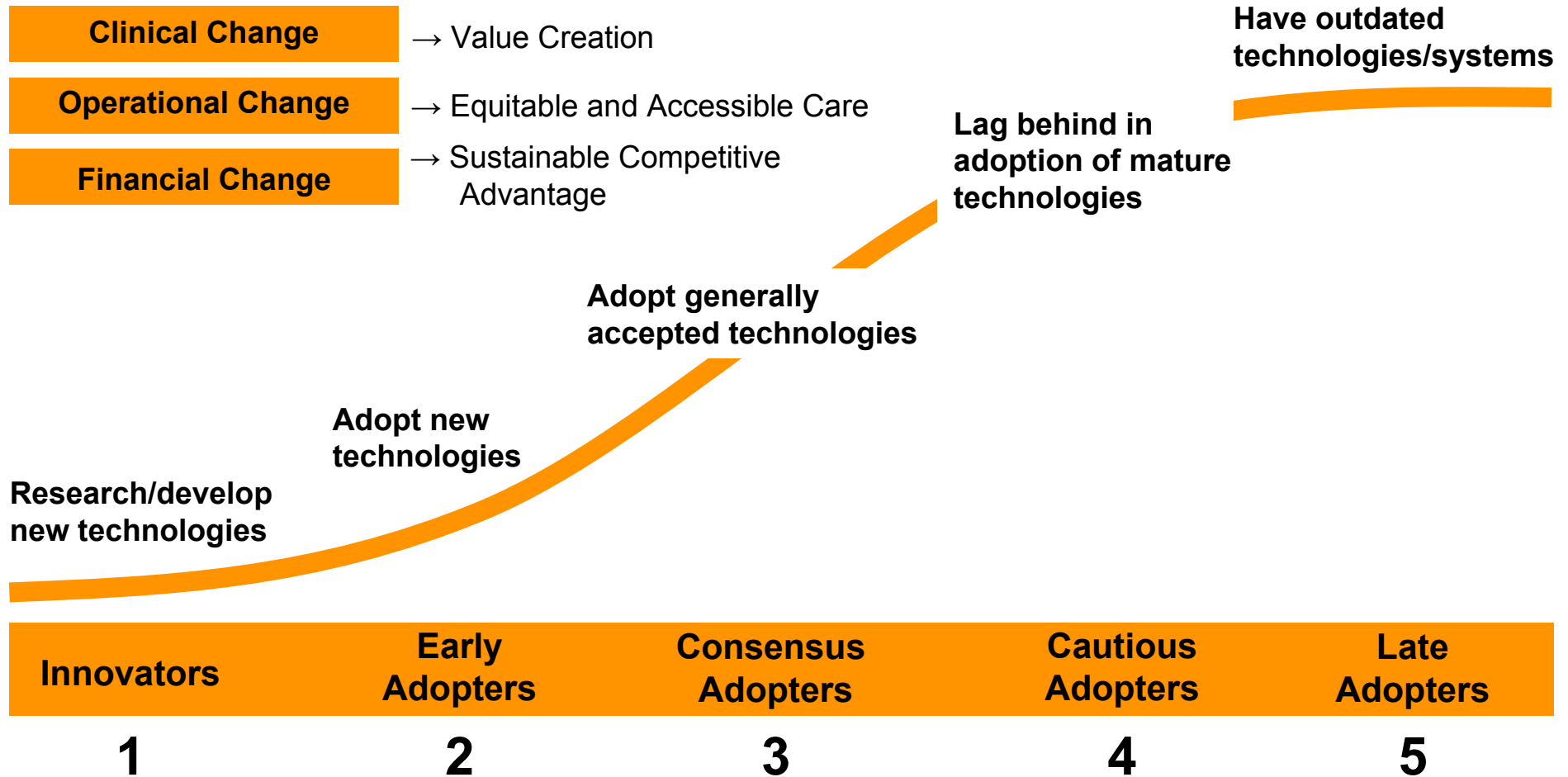
Agenda

Global Strategic Imperatives in Health Care

Clinical Technologies Transforming Medicine

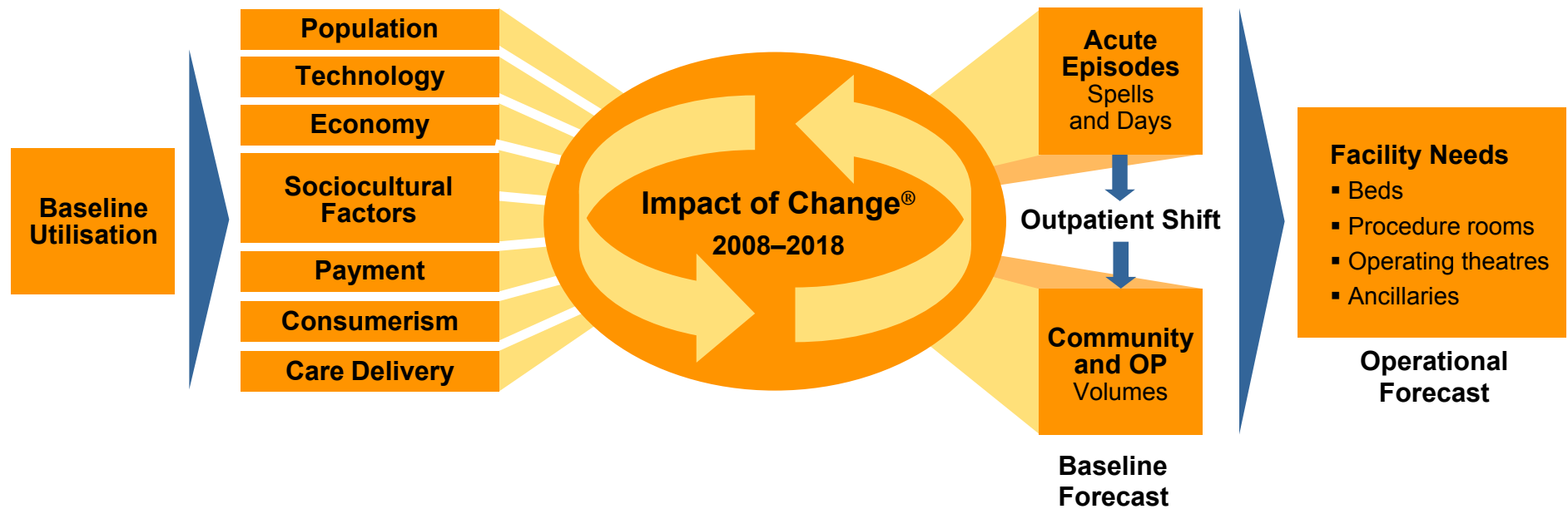
Building Road Maps for Innovation

Clinical Innovation and Technological Change Enable Successful Care Transformation



Source: Sg2 Analysis, 2008.

Sg2's IoC Model Forecasts Future Resource Needs for Care Transformation



A Comprehensive Set of Factors Impact IP Utilisation, LOS and OP Visits

Sociocultural Factors

- Diabetes
- Obesity
- Respiratory pollutants
- Physical inactivity
- Smoking

Technology

- ICDs
- MIS hip and knee arthroplasty
- Carotid stenting with embolic protection
- Artificial discs

Outpatient Shift

- Uterine artery embolisation
- Image-guided focused ultrasound
- Unicompartmental knee replacement
- Noninvasive angiography
- Laparoscopic cancer surgery
- Hip resurfacing and MIS hip surgery
- Percutaneous radiofrequency ablation

**Increased
Hospitalisation**

Care Delivery

- Defensive medicine
- Nonphysician/surgeon assistants
- Population-based screening for cancer and atherosclerosis

**Input vs.
Output**

**Decreased
Hospitalisation**

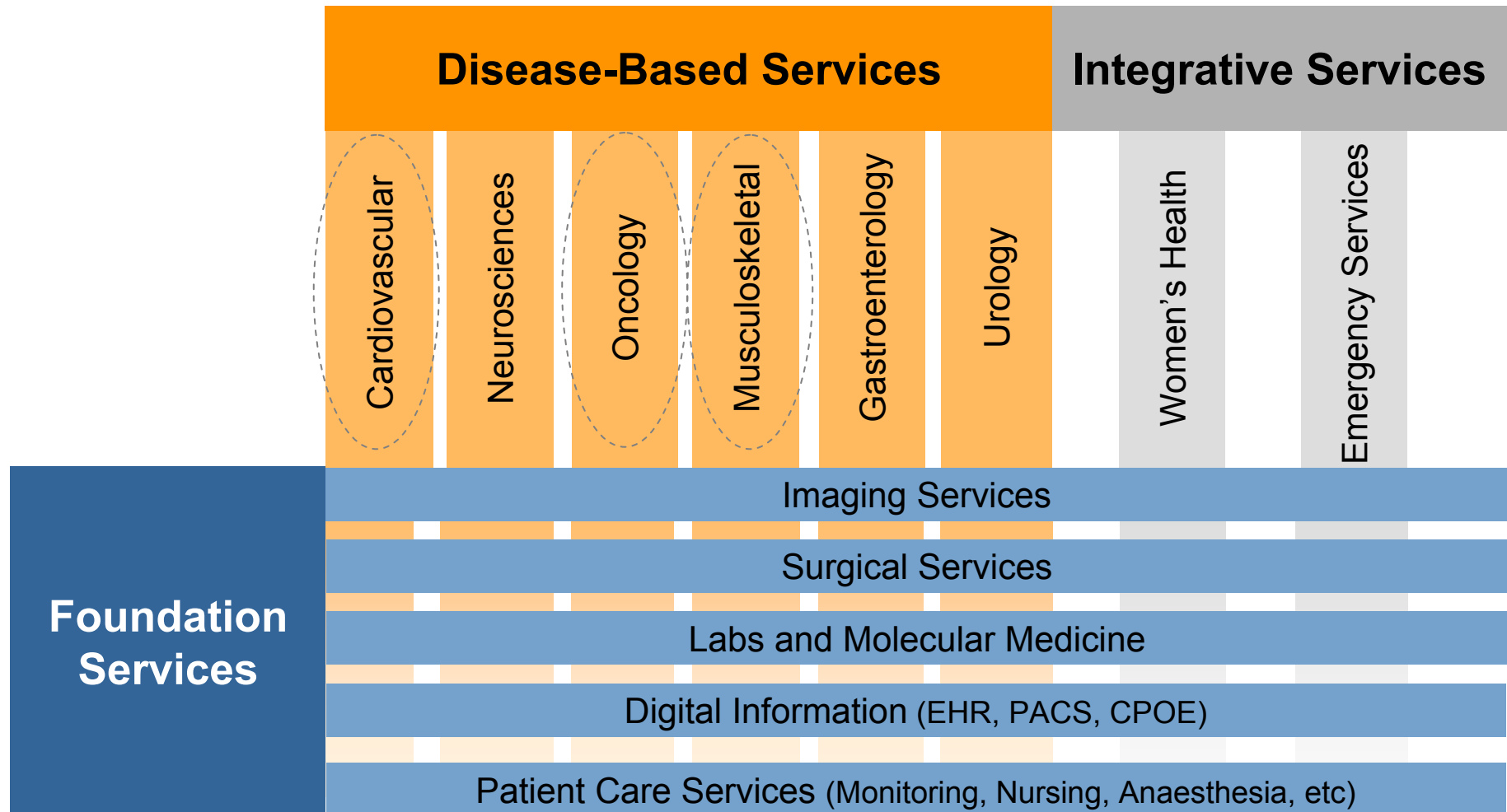
Payment and Economic Factors

- Private sector funding
- Public sector funding
- Insurance programs

Technology

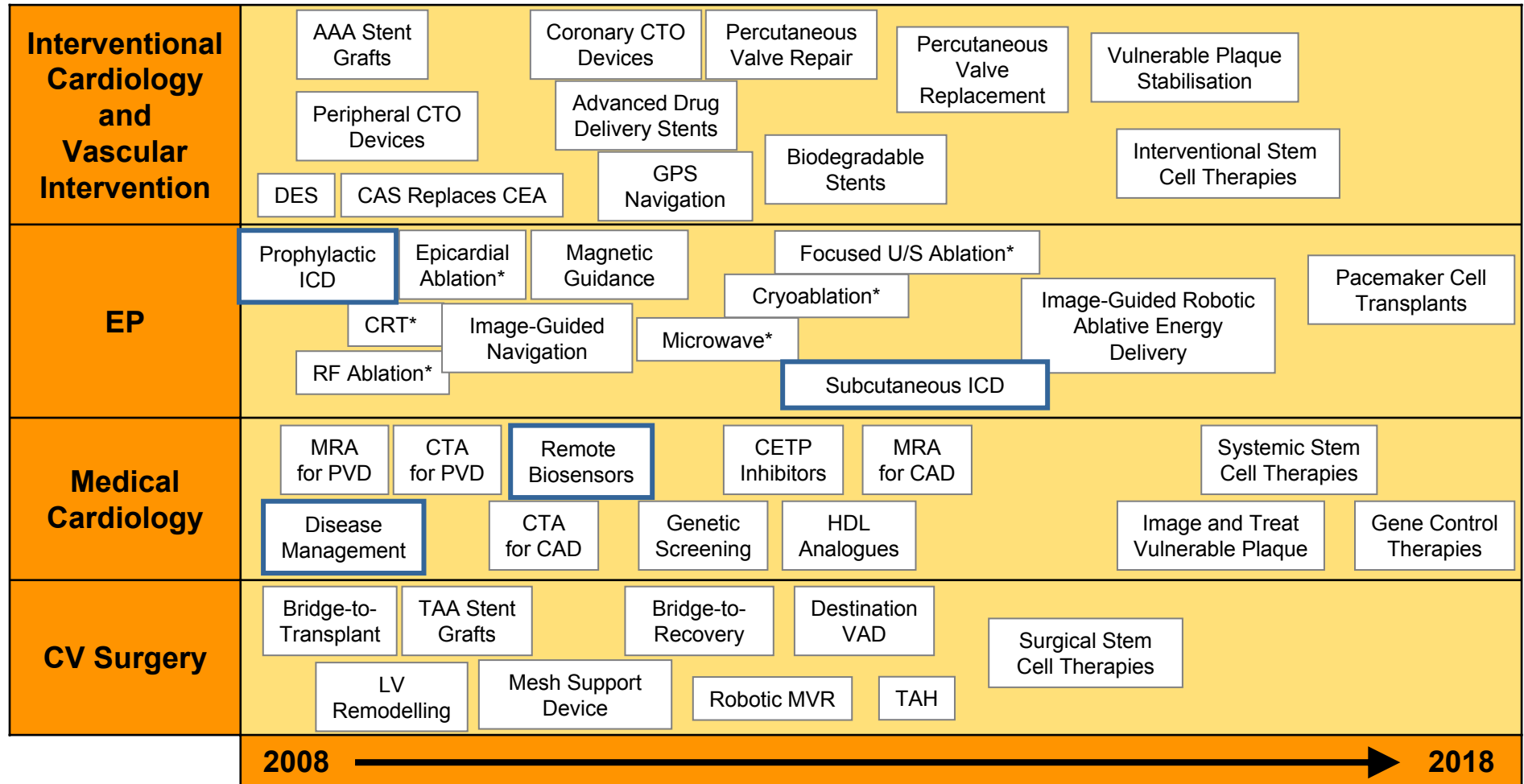
- Statins
- Vaccines
- PET/CT

Health Care Is Comprised of a Matrix of Interlocking Programmes



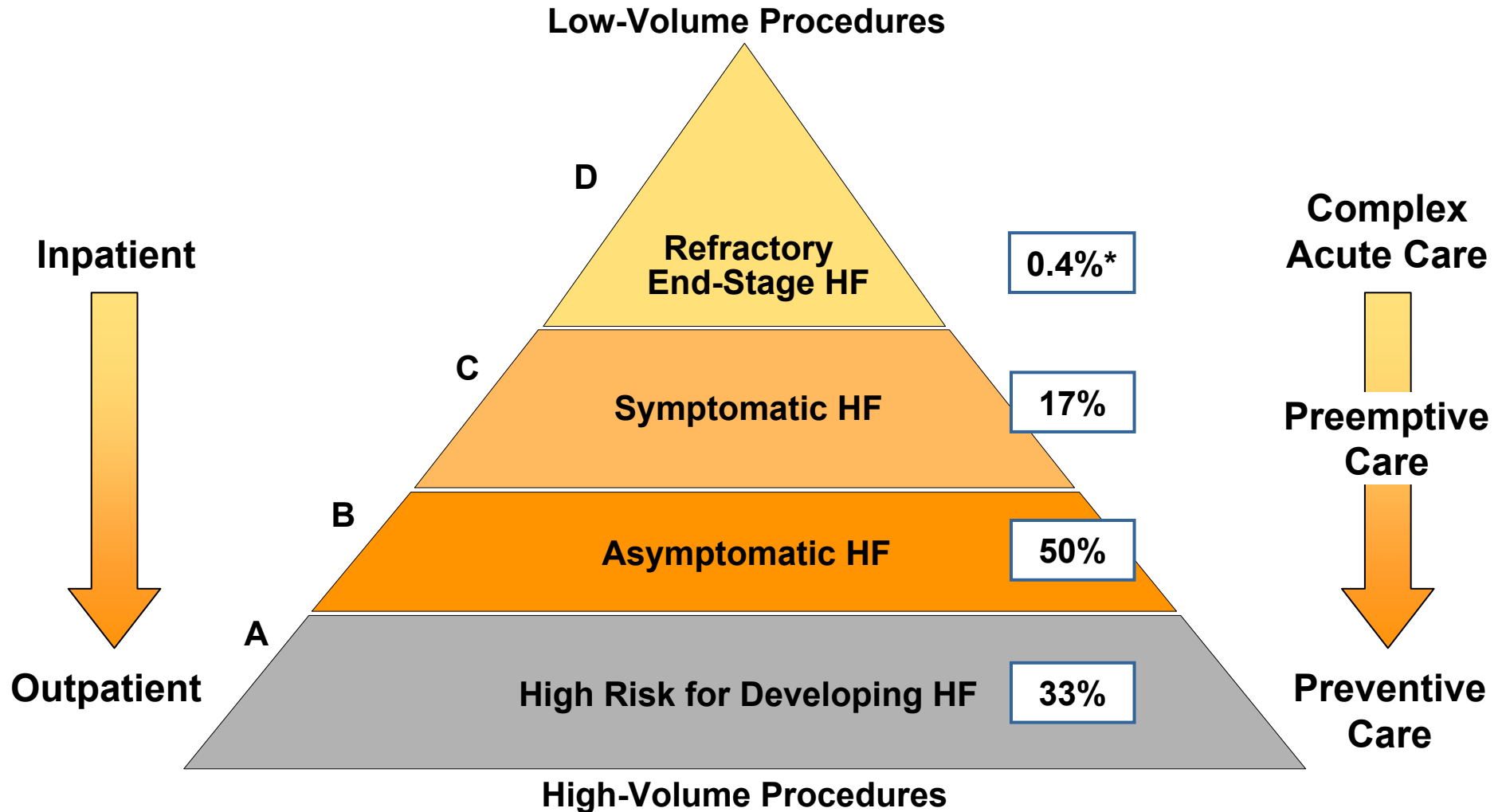
Source: Sg2 Analysis, 2008.

Improved Management of CHF Requires Prevention and Preemption



*Ablative therapies and biventricular lead placement enabled by biplane imaging.
Source: Sg2 Analysis, 2008.

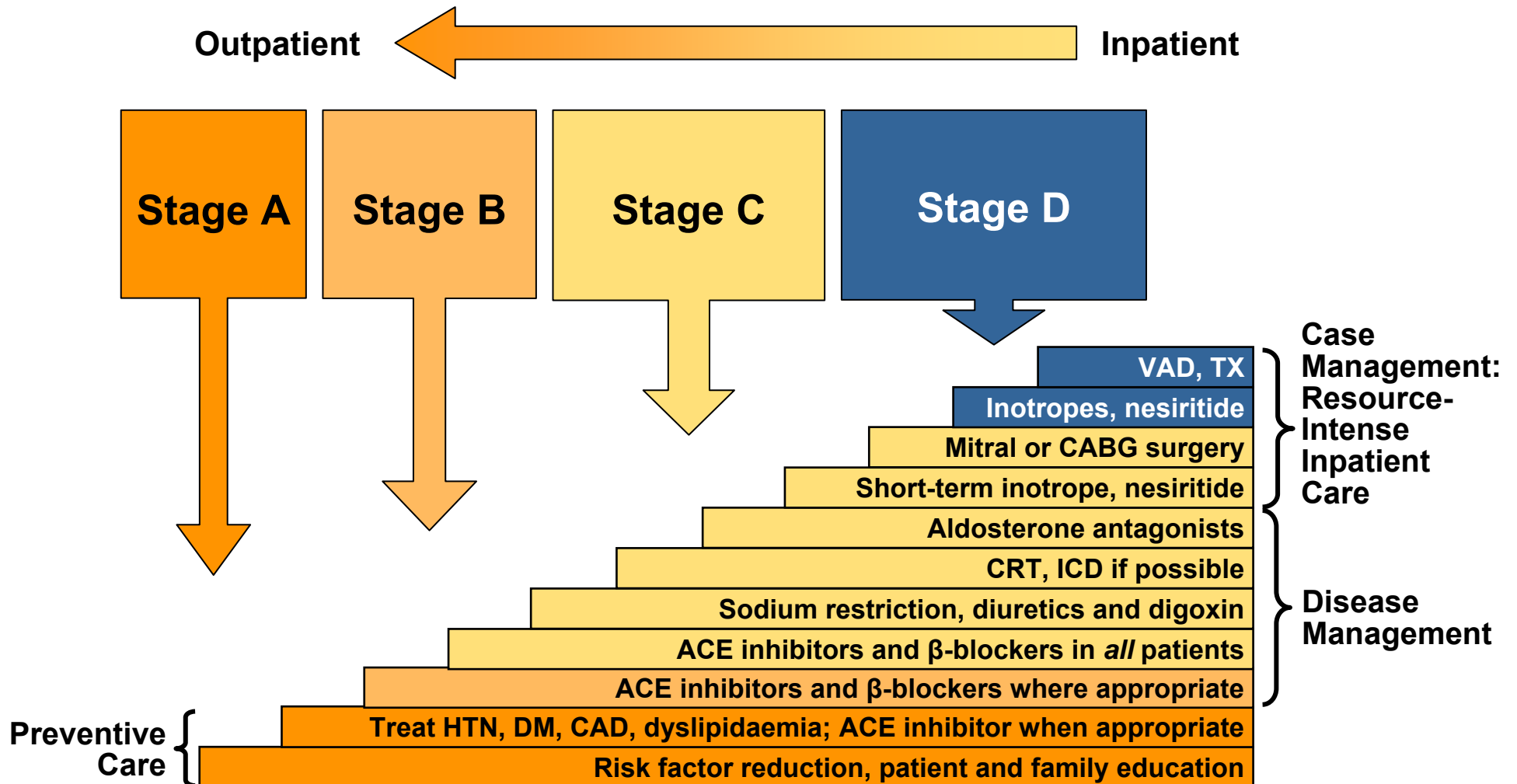
Disease Management Redefines the Care Pyramid Across the Natural History of CHF



HF = heart failure; MI = myocardial infarction; LV = left ventricular; CAD = coronary artery disease.

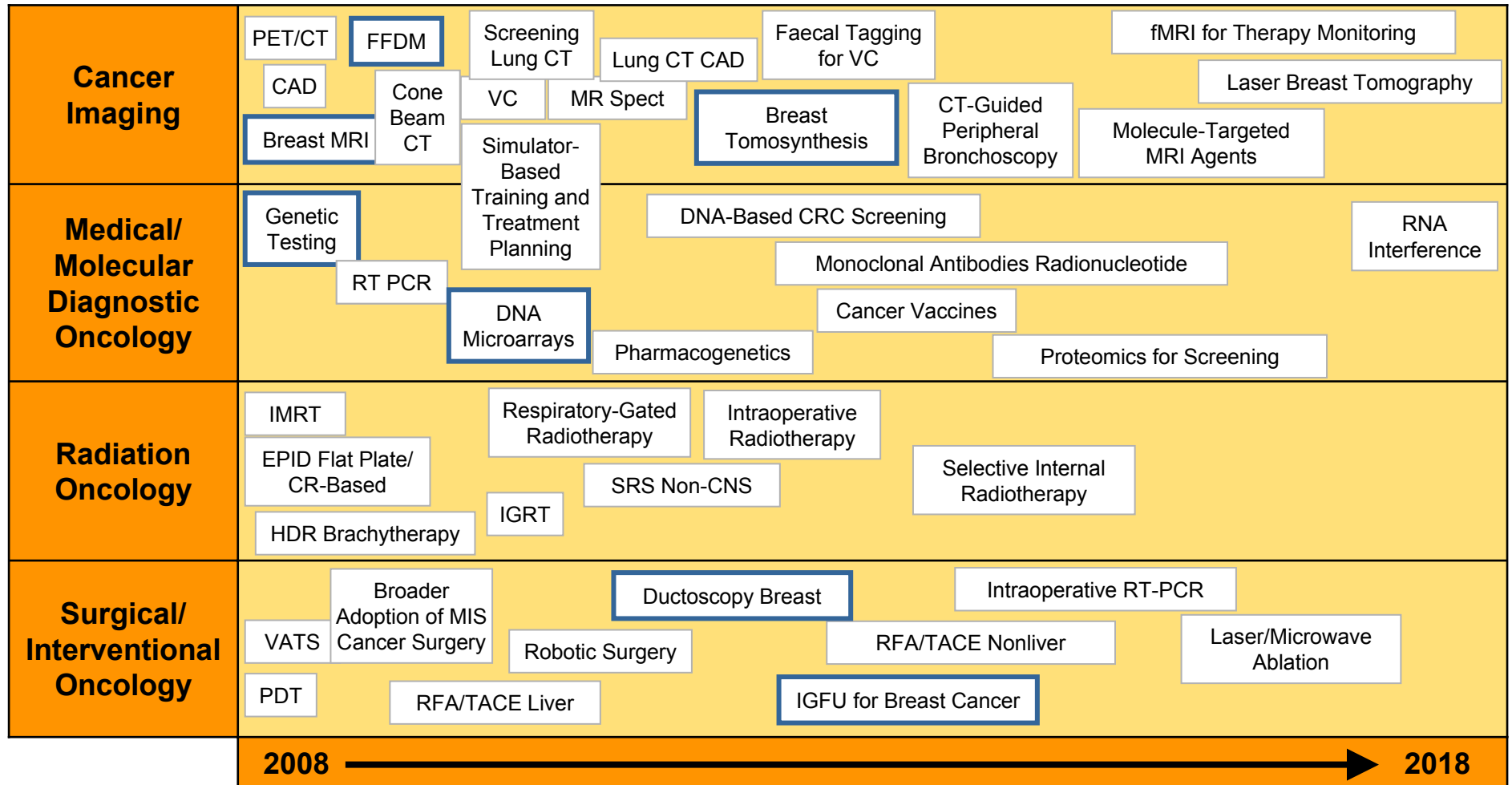
Sources: *Olmsted County: Ammar KA et al. *Circulation* 2007;115:1563–1570; Yancy CW. *Rev Cardiovasc Med* 2005;6:S43–57; Sg2 Analysis, 2008.

... Refocusing on Interventions with Greatest Benefit at Lowest Cost Across the Care Cycle



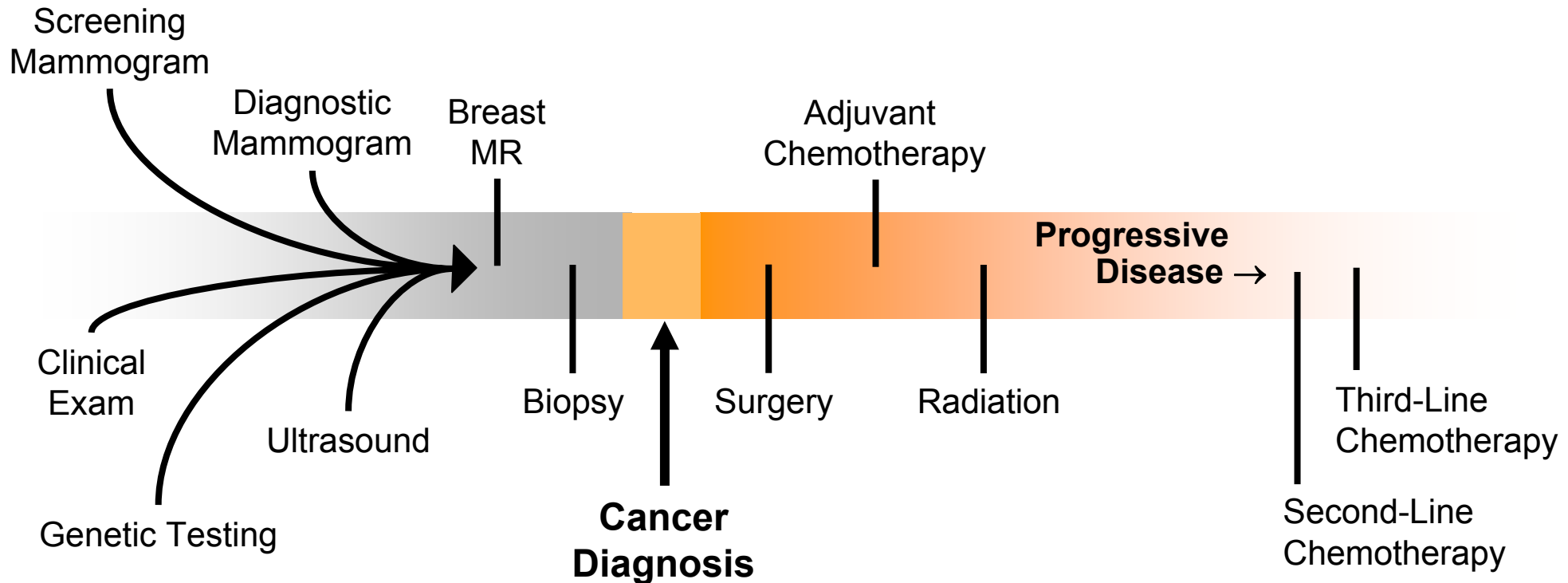
Sources: Yancy Cw. *Rev Cardiovasc Med* 2005;6:S43–57; Sg2 Analysis, 2008.

Emerging Technologies Tailor Breast Cancer Care to Tumour Type and Patient Specifics



Breast Cancer: Comprehensive Programmatic Approach to the Care Continuum

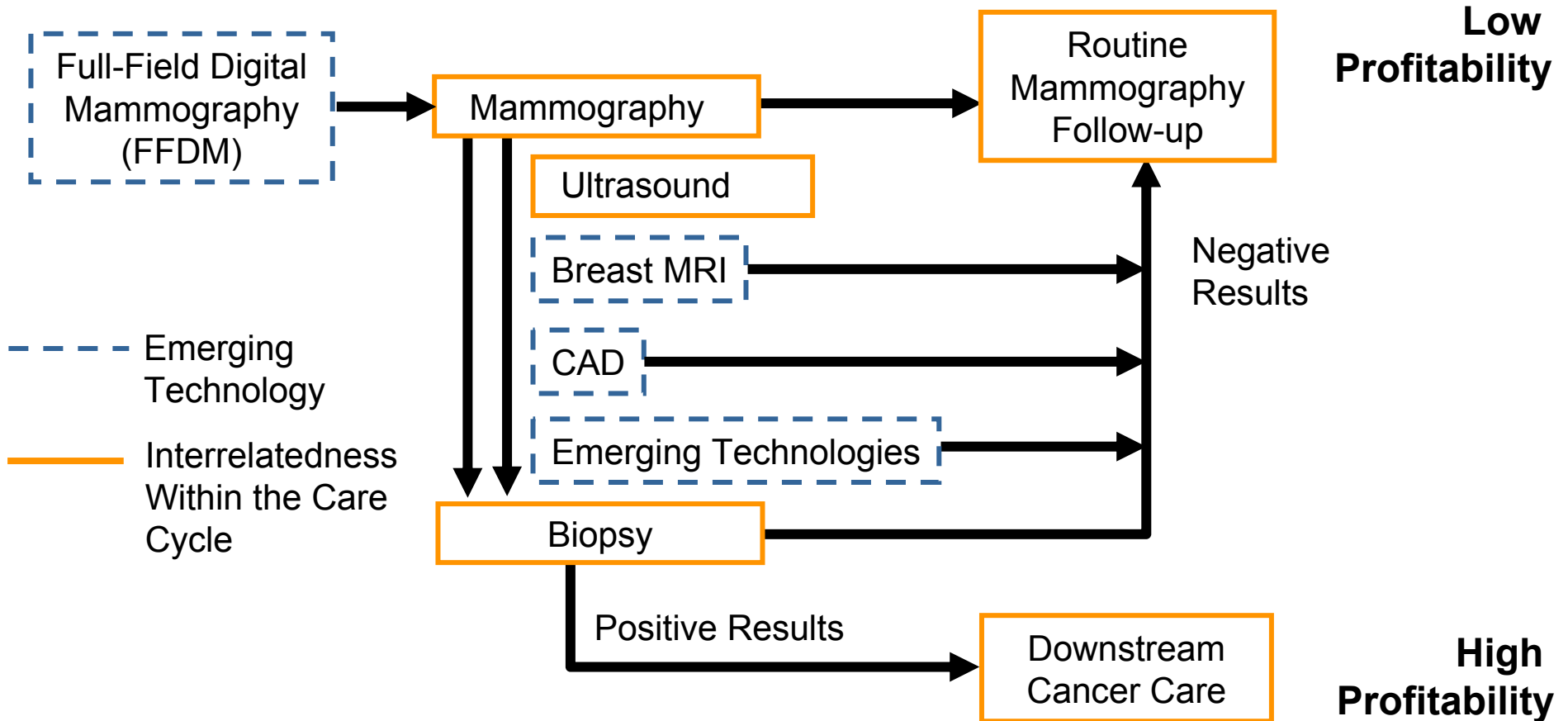
Breast Cancer Care Path



Source: Sg2 Analysis, 2008.

Breast Screening and Diagnostics Triangulate Amongst Multiple Modalities

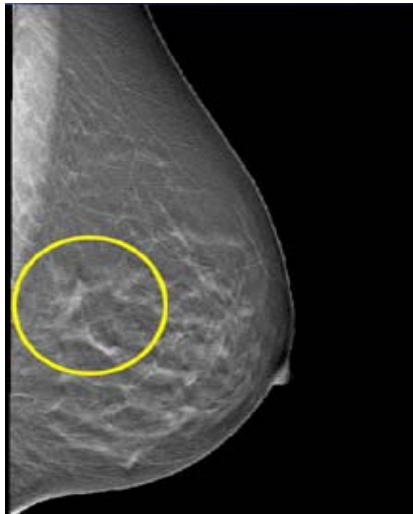
Elements of a Breast Cancer Screening Program



Personalised Medicine Targets Specific Tumour and Patient Attributes

Tumour-Specific Programs

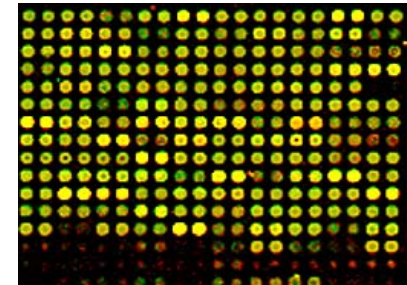
Breast Tomosynthesis



Courtesy of Hologic.

Molecular Medicine

Microarray



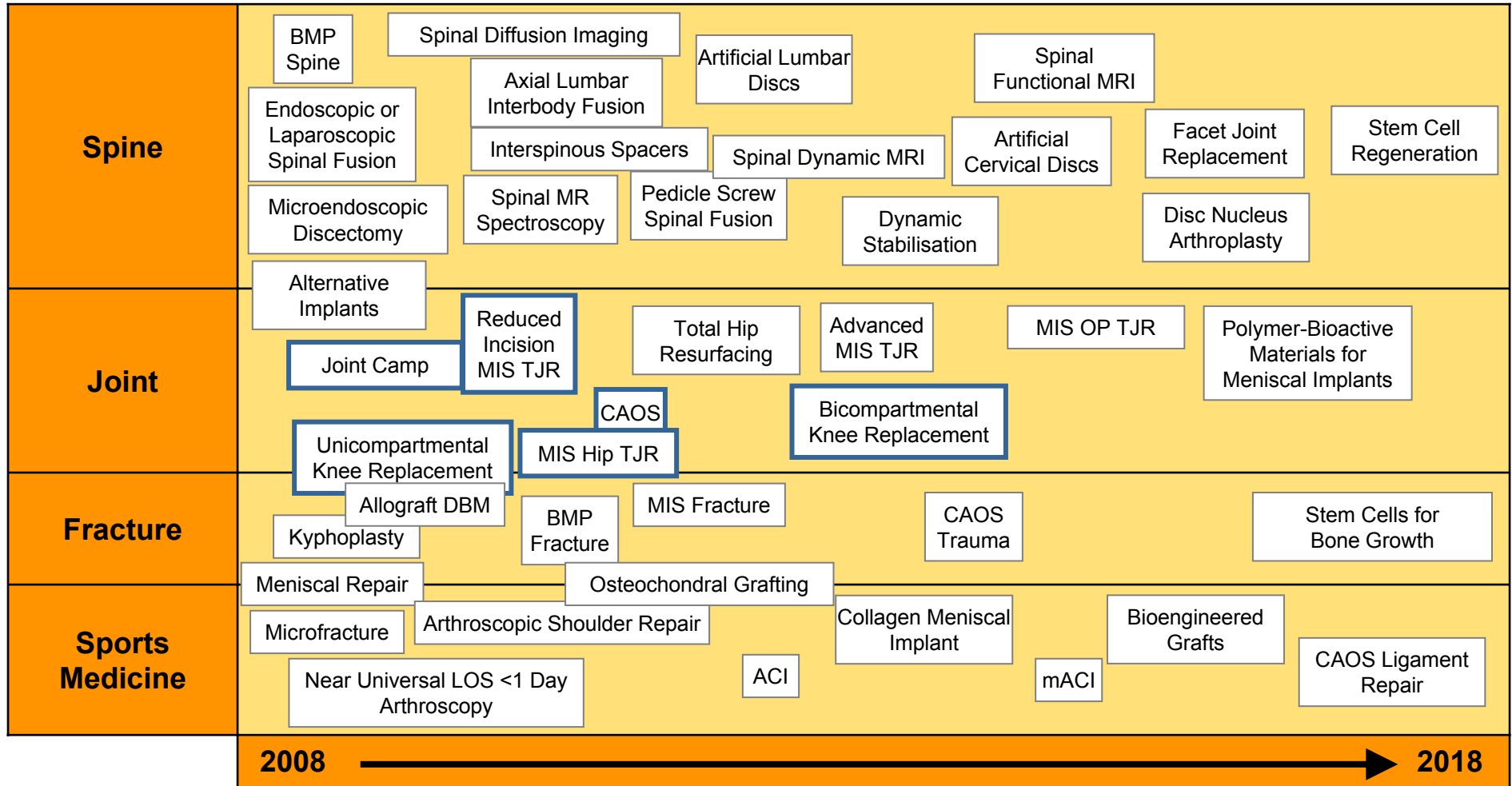
Targeting the Tumour (Her-2 Amplification by FISH, Oncotype DX®)

- Increased tumour subspecialisation
- Improved prediction of prognosis and response to therapy
- More targeted treatments requiring linked diagnostics

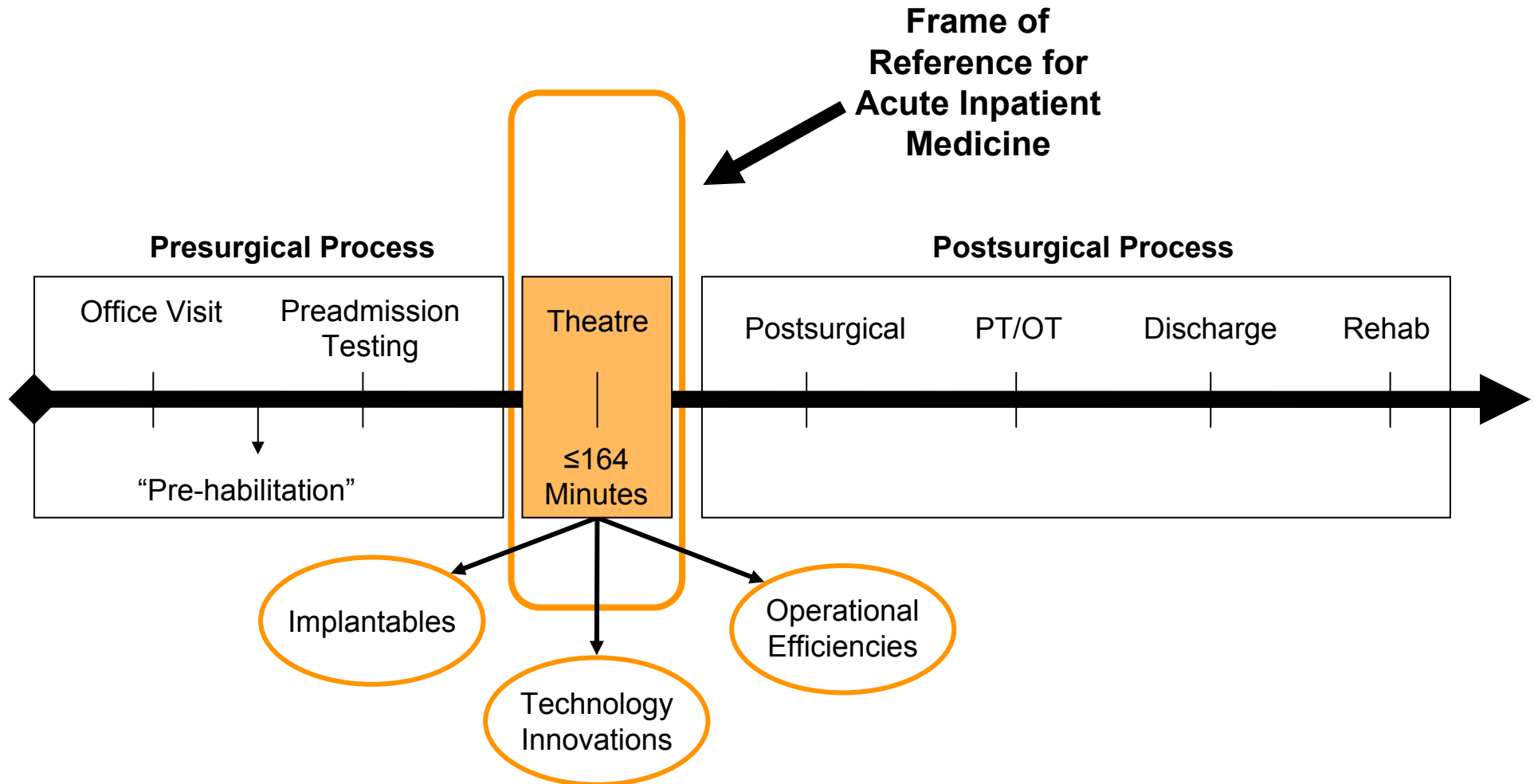
Treating the Patient

- Organ is imaged and biopsied for disease.
- Patient endures organ-specific surgery and radiation.
- Patient suffers and needs supportive services.

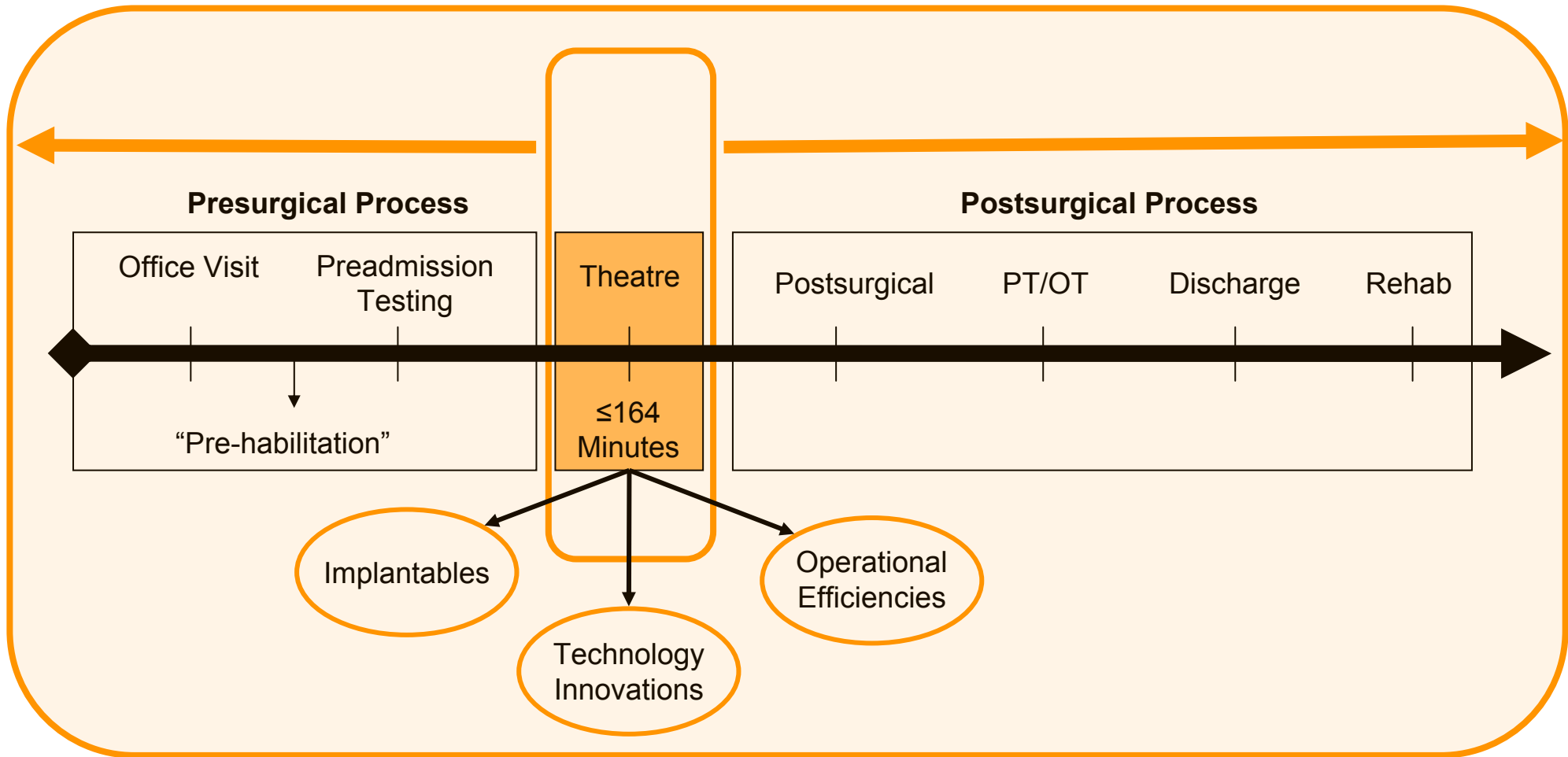
MIS Techniques Enable LOS Reduction in Joint Replacement



... But Care Optimisation Necessitates Expanding the Frame of Reference...



... To Include the Entire Cycle of Care



Agenda

Global Strategic Imperatives in Health Care
Clinical Technologies Transforming Medicine
Building Road Maps for Innovation

Strategic Technology Investment Requires Programmatic Development

Sg2 Technology Evaluation and Planning (STEP™) Process

Technology Assessment

Technology Adoption

Where Are We?

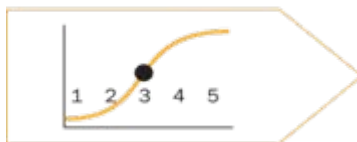


Profile

Market Position

Competitive Landscape

Technology Profile



Where Do We Need to Be?

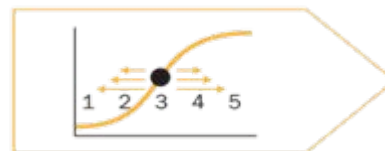


Plan

Industry Outlook

Technology Priorities

Strategic Positioning



How Do We Get There?



Manage

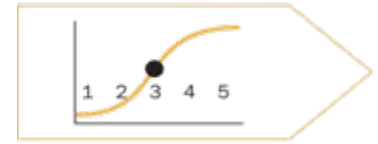
Programmatic Development

Diffusion

Monitoring and Feedback



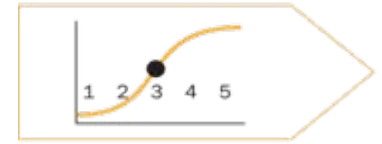
Profile: An Example— Assessing an Oncology Programme



Considerations

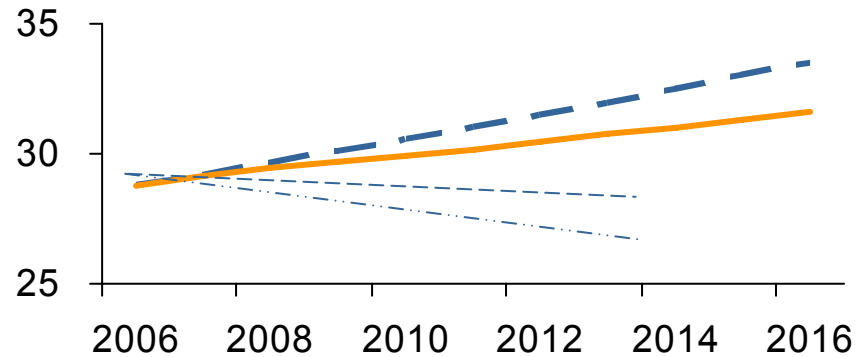
	1	2	3	4	5	
Imaging			■			<ul style="list-style-type: none"> ▪ Leader in screening lung CT ▪ Still undecided on digital mammography offerings ▪ Plans in place but currently behind in general CT and MRI offerings
Surgery			■			<ul style="list-style-type: none"> ▪ Well-established laparoscopic practice and leadership ▪ Historic leader in robotic technology
Radiation Oncology			■			<ul style="list-style-type: none"> ▪ Essentially complete array of treatment options
Medical Oncology				■		<ul style="list-style-type: none"> ▪ Minimal drug trial participation ▪ No genetic testing
Path/Lab/IT			■			<ul style="list-style-type: none"> ▪ Hospital-wide PACS ▪ Significant updates to RIS necessary ▪ Planning on EMR and CPOE

Profile: Taking An External Point of View



NASA Johnson Space Center - Earth Sciences and Image Analysis (NASA-JSC-ES&IA).

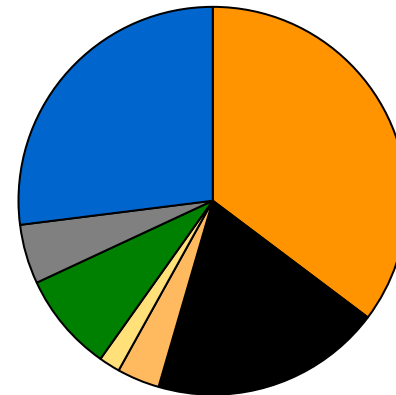
Market Assessment



Demand Forecasting

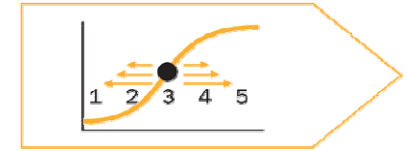


Staffing and Manpower Analysis



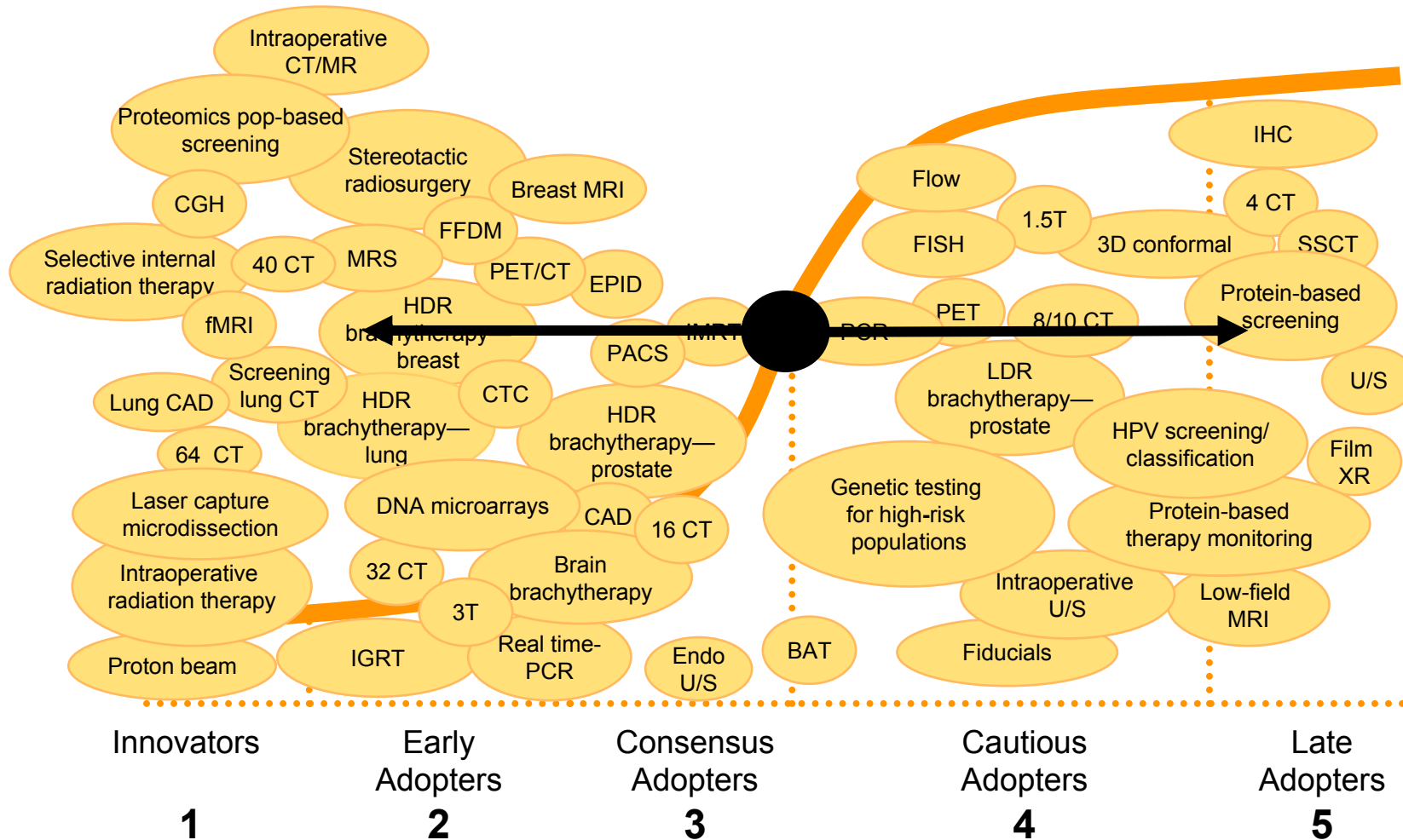
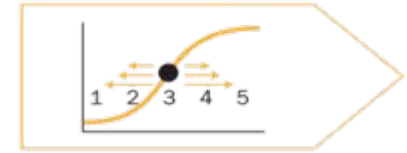
Competitor Evaluation

Plan: Defining the Value Proposition

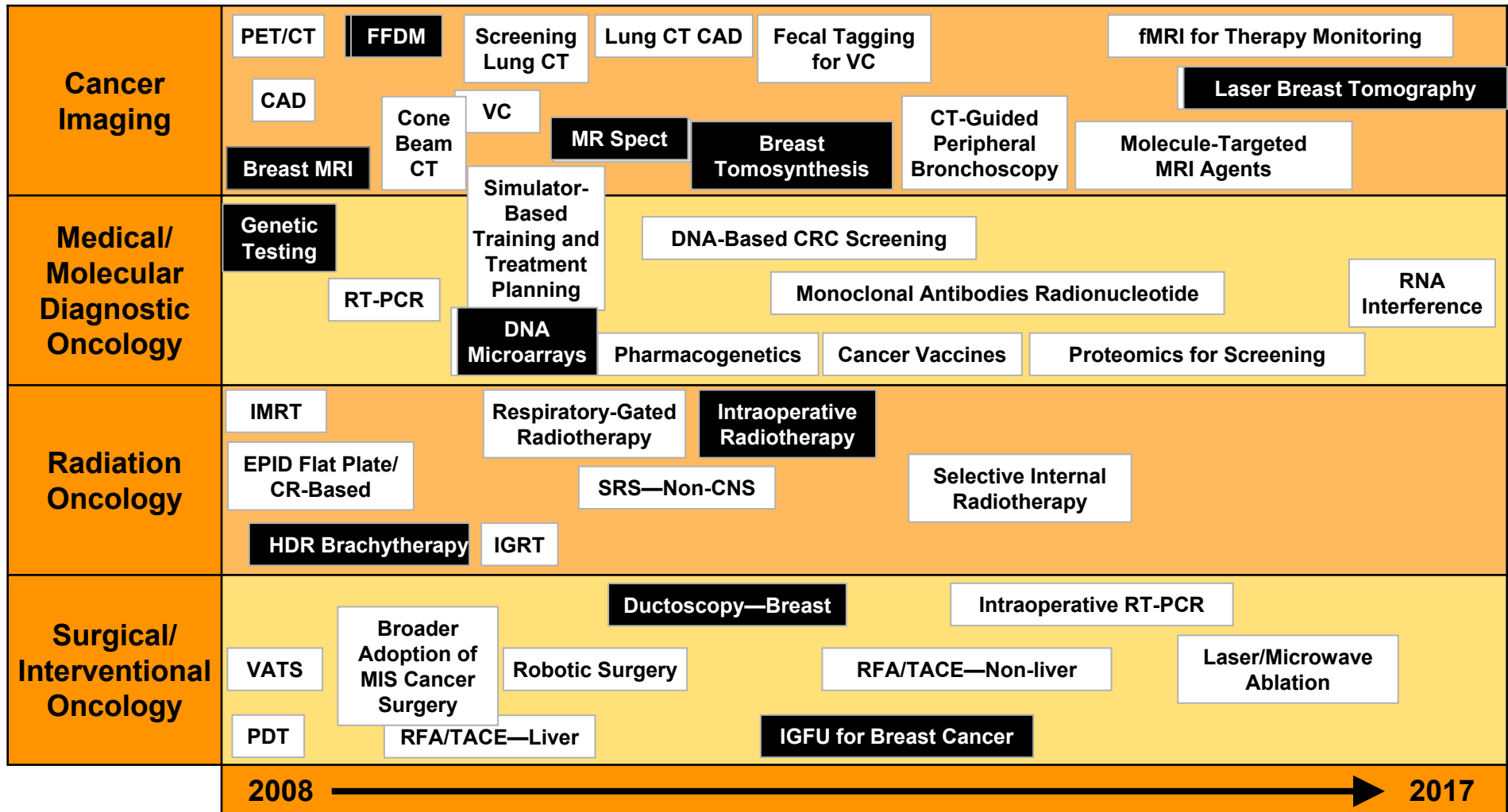


Destination (Technical Expertise) Characterised by significant capital investments in technology and clinical expertise that pulls tertiary and quaternary referrals		Customised Care (Customer Intimacy) Characterised by a focus on coordinated care, intimate service and pleasing aesthetics		Value Offering (Efficiency, High Throughput) Characterised by a focus on efficient patient work flow processes, access and convenience	
Pros <ul style="list-style-type: none"> ▪ Emphasis is on customer acquisition. ▪ Differentiates system and brand as cutting edge health care provider ▪ Halo effect can lead to secondary referrals. ▪ High entry barriers due to significant capital requirements 	Cons <ul style="list-style-type: none"> ▪ Significant initial capital expenditures ▪ Competitors can imitate by acquiring similar capabilities. ▪ Threat of displacement by later cheaper, distributed technology ▪ Success contingent upon successful institutional-clinician partnerships 	Pros <ul style="list-style-type: none"> ▪ Emphasis is on customer retention. ▪ Difficult for competitors to imitate because successful coordination of care breeds customer loyalty. ▪ Expected growth of preventive strategies, disease management and remote monitoring technologies supports the focus on customer intimacy. 	Cons <ul style="list-style-type: none"> ▪ Significant initial investment in information technology ▪ Success is contingent on the quality and soft skills of front line clinicians and support staff, which will require higher levels of local management. 	Pros <ul style="list-style-type: none"> ▪ Emphasis is on both customer acquisition and retention. ▪ Imitation by competition requires an investment in enabling technologies and process engineering. ▪ Expected growth in robotics and MIS techniques supports high-throughput value proposition. 	Cons <ul style="list-style-type: none"> ▪ Vulnerable to replication due to low barriers to entry

Plan: An Example— Setting Priorities in Oncology

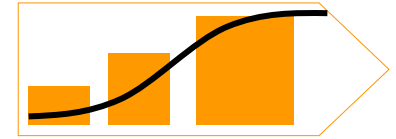


Manage: An Example— Building the Road Map for Oncology



Note: Timings reflect consensus adoption.
Source: Sg2 Analysis, 2008.

Manage: Programmatic Development & Performance



- Clinical Outcomes**
- Operational Efficiency**
- Financial Growth**

Explorers

- Breast MRI bx
- Tomosynthesis
- Avastin and other targeted therapies
- TAILORx trial (risk assessment by genomic fingerprinting)

Trailblazers

- "UltraClinics®" rapid dx
- FFDM
- ION Protocol Analyser (pharmaco-economic analysis)
- Genetic counselling of offspring
- Plastic surgery reconstruction

Pathfinders

Multidisciplinary decisions:

- Online decision support for care pathways
- Tumour board guidance in complex cases
- ER status, histologic grade and staging determine therapeutic alternatives
- Her2 testing guides rx

Followers

Disparate disciplines seek means to coordinate treatment modalities and systematically evaluate outcomes.

Wanderers

Individual surgical preference dictates surgical ablative approach without systematic consideration of role of XRT and pharmacologic alternatives and combinations.

Innovating Paradigms

1

Redesigning Protocols

2

Leading Practices

3

Matching Benchmarks

4

Unexplained Variation

5

The Future of Health Care Hinges on Creating Value in a Competitive Market

Redefining Health Care *Creating Value-Based Competition on Results*

Changing the game from zero sum to positive sum competition
Michael Porter and Elizabeth Olmsted Teisberg

“**Scope** of practice is too broad.”



Find Focus

“**Scale** of practice is too limited.”



Concentrate Experience

“**Frame of reference** is inappropriate.”



Embrace the Cycle of Care

Superior Performance Will Require the Transformation from Independence into Interdependence

Yesterday

- Clinician-focused
- Privileged access of information
- Deferral to clinician authority
- Subspecialty silos
- Artisan culture of craftsmanship and one-off solutions
- Autonomy requiring individual responsibility for error avoidance



Tomorrow

- Patient-centred
- Information transparency
- Empowerment of patient choice
- Cross-functional teams
- Evidence-based standards and care pathways
- Interdependence requiring system solutions for error preemption



health care intelligence

Sg2 is a forward-thinking health care research, consulting and education company. Sg2 analyses emerging clinical developments, technological advancements and market trends to help clients make informed business decisions, advance clinical excellence, streamline operations, grow market share and exceed financial goals.