Capital Allocation in R&D and DPU Deep Dive

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Delivering our strategy

Grow a diversified global business

Deliver more products of value

Simplify the operating model

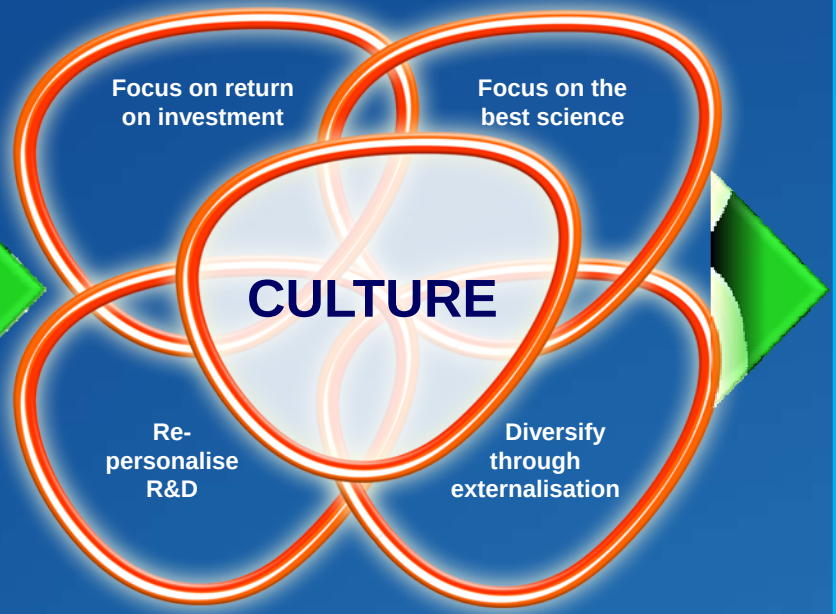
- 38% sales generated outside US & EU
- £5.3bn of Group sales from strengthened EM business
- £3.5bn Vaccines sales (+22% vs 2008)
- £5.2bn Consumer Healthcare sales (+18% vs 2008)
- 22% of sales “White Pill Western Market” vs 40% in 2007
- Reduced sales force in US and EU by ~8,000; added ~7,500 in RoW since 2007
- Global support functions; 23% decrease in costs vs 2008
- Exited 19 manufacturing sites since 2006

R&D strategy

Grow a diversified global business

Deliver more products of value

Simplify the operating model

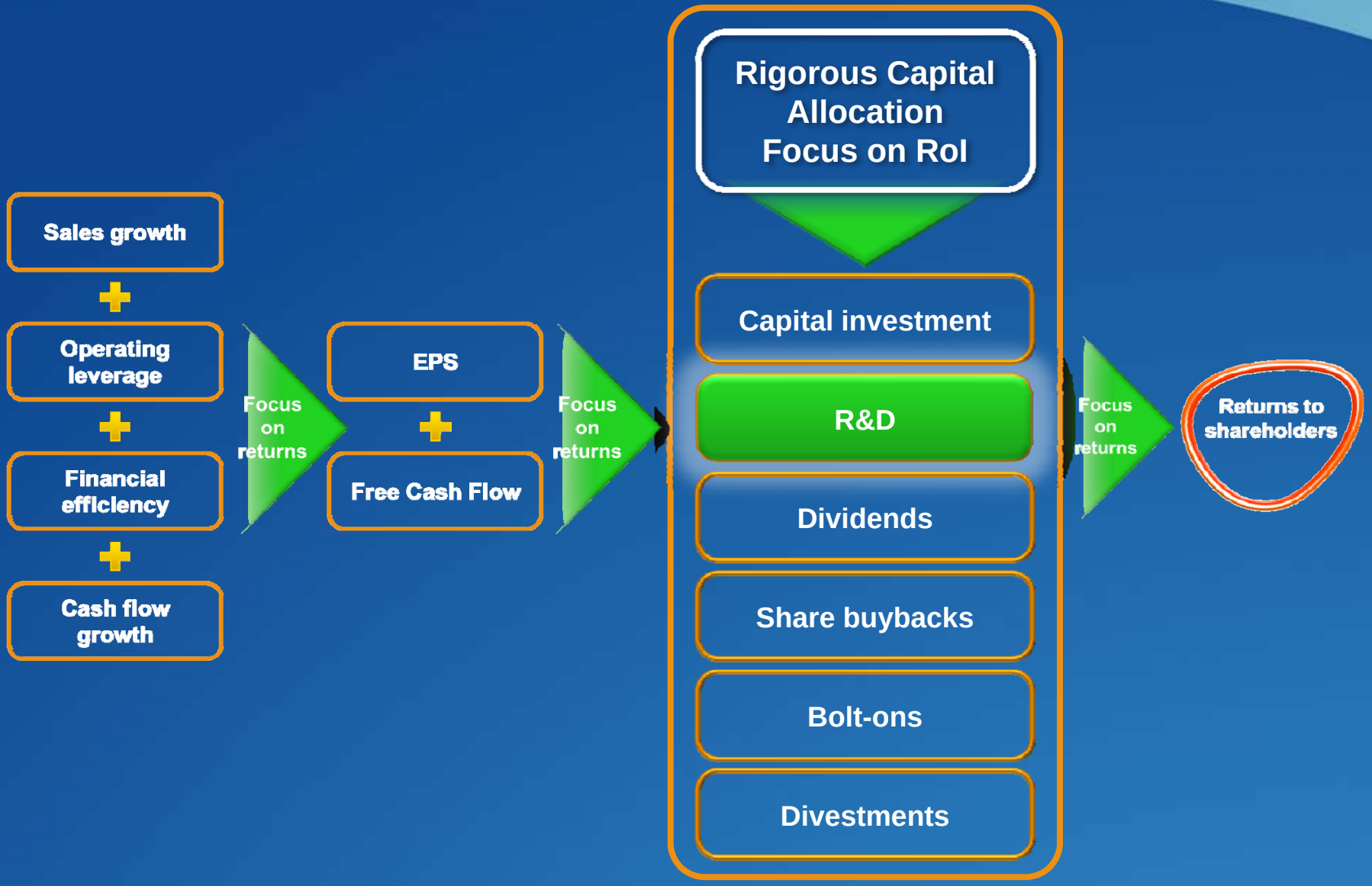


Building late stage pipeline

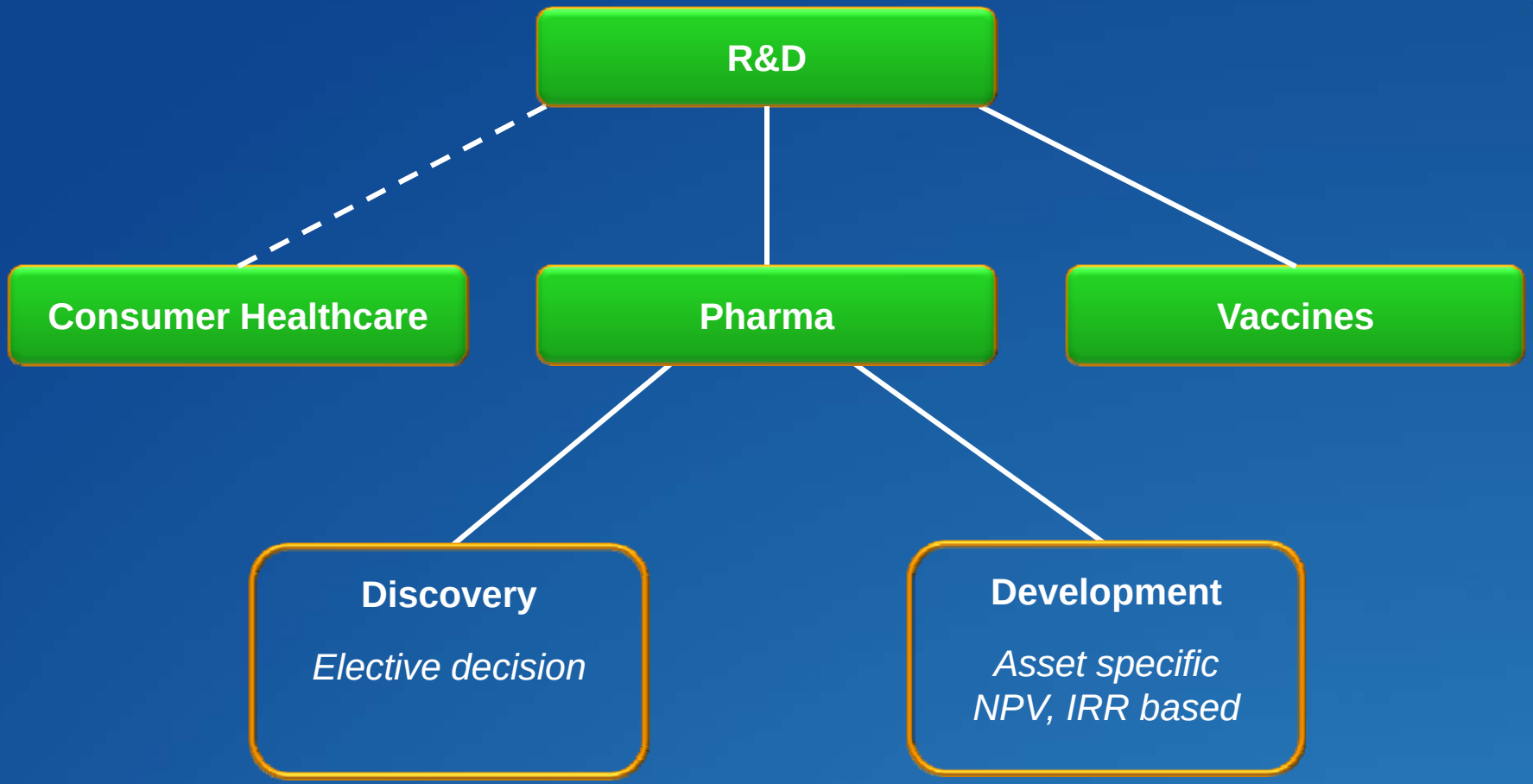
Re-engineering drug discovery organisation to ensure sustainability of the pipeline

Enhancing returns on R&D investment

R&D competes for capital in GSK



Different approach to capital allocation in early and late stage pharma



Core R&D budget expected to be approximately £3.7bn in 2012

Rigorous capital allocation process within R&D

Drug discovery

Discovery Investment Board (Pharma R&D)

- Allocates DPU funding on a fixed-term business cycle with committed deliverables and costs
- Earmarks funding but can revoke if DPU underperforms
- Clear financial incentives for successful DPUs

Drug development

Portfolio Investment Board*

- Asset investment decisions at Phase IIB, Phase III, file and launch, Phase III/IV
- Annual funding re-distribution across all R&D Units (incl. Rx and Vx)

Scientific Review Board

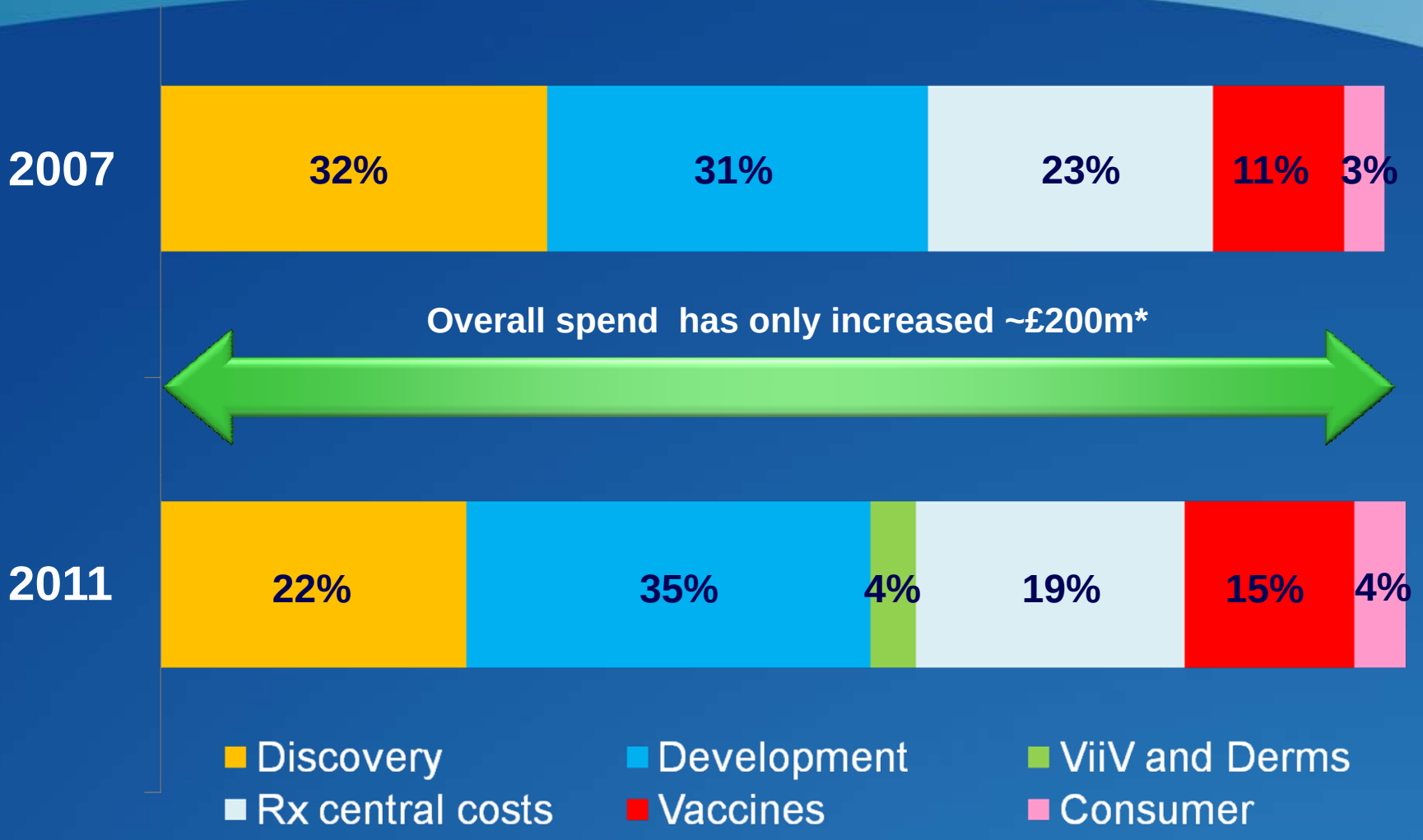
Global Safety Board

New Product Supply Board

Medicines Vision

*PIB governs Pharma R&D. An independent parallel body with equivalent inputs governs Vaccines (Vaccines Investment Board operates from Phase I)

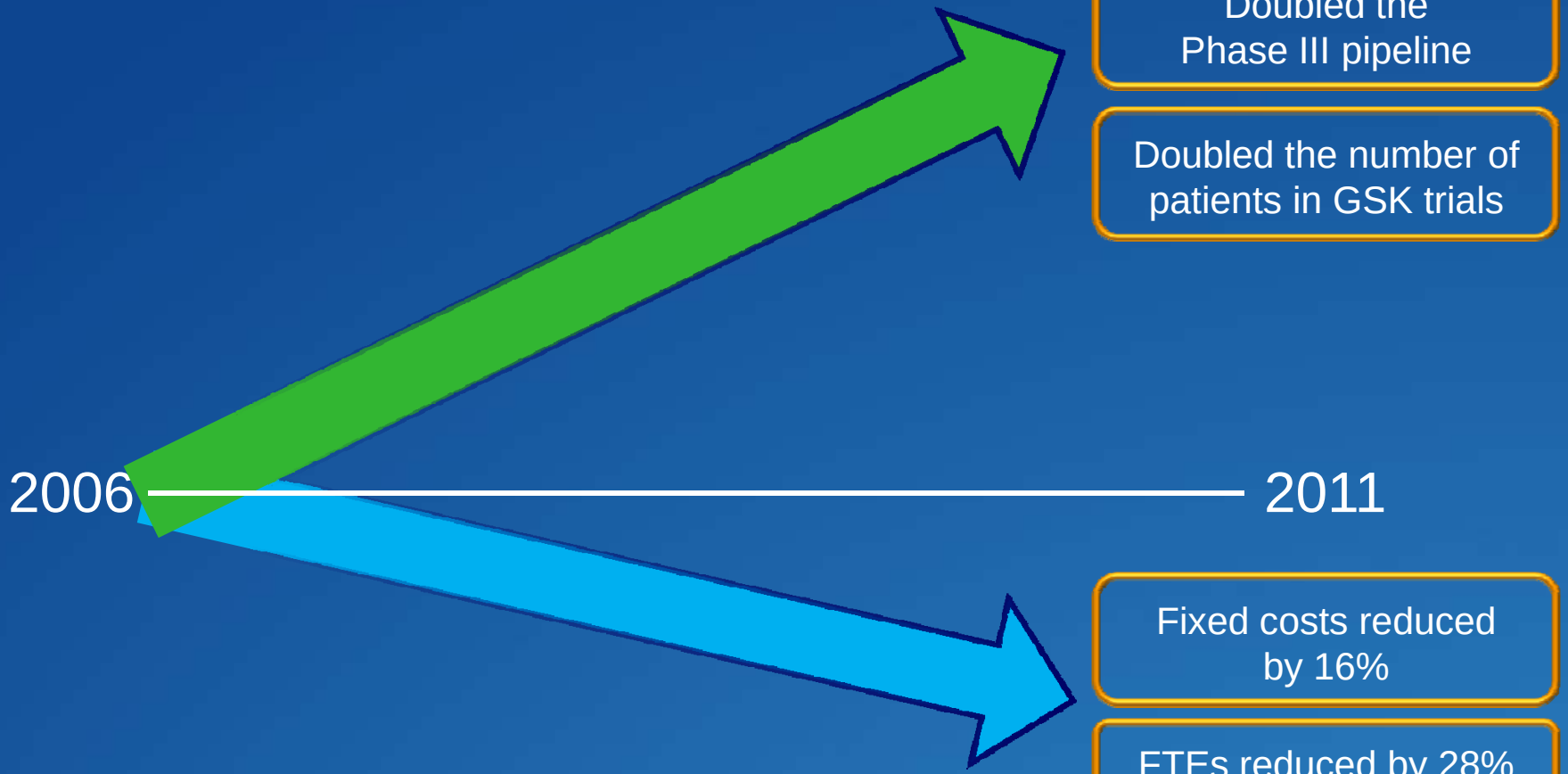
Absolute R&D spend is broadly flat but the shape has changed



* Growth at CER

- Central costs include facilities, central support functions (i.e. HR, IT, Finance, Legal)
- Certain costs including those relating to EM and Japan R&D have moved from central costs to development since 2007. For consistency, they are shown in central costs in both years

Some early impact of cost reduction is improving returns



Data for Pharma R&D only

Shape of R&D pipeline is different

Exited

- Urology
- GI
- Hypertension
- Pain/ depression/ anxiety

Created

- Ophthalmology
- Dermatology
- Rare diseases

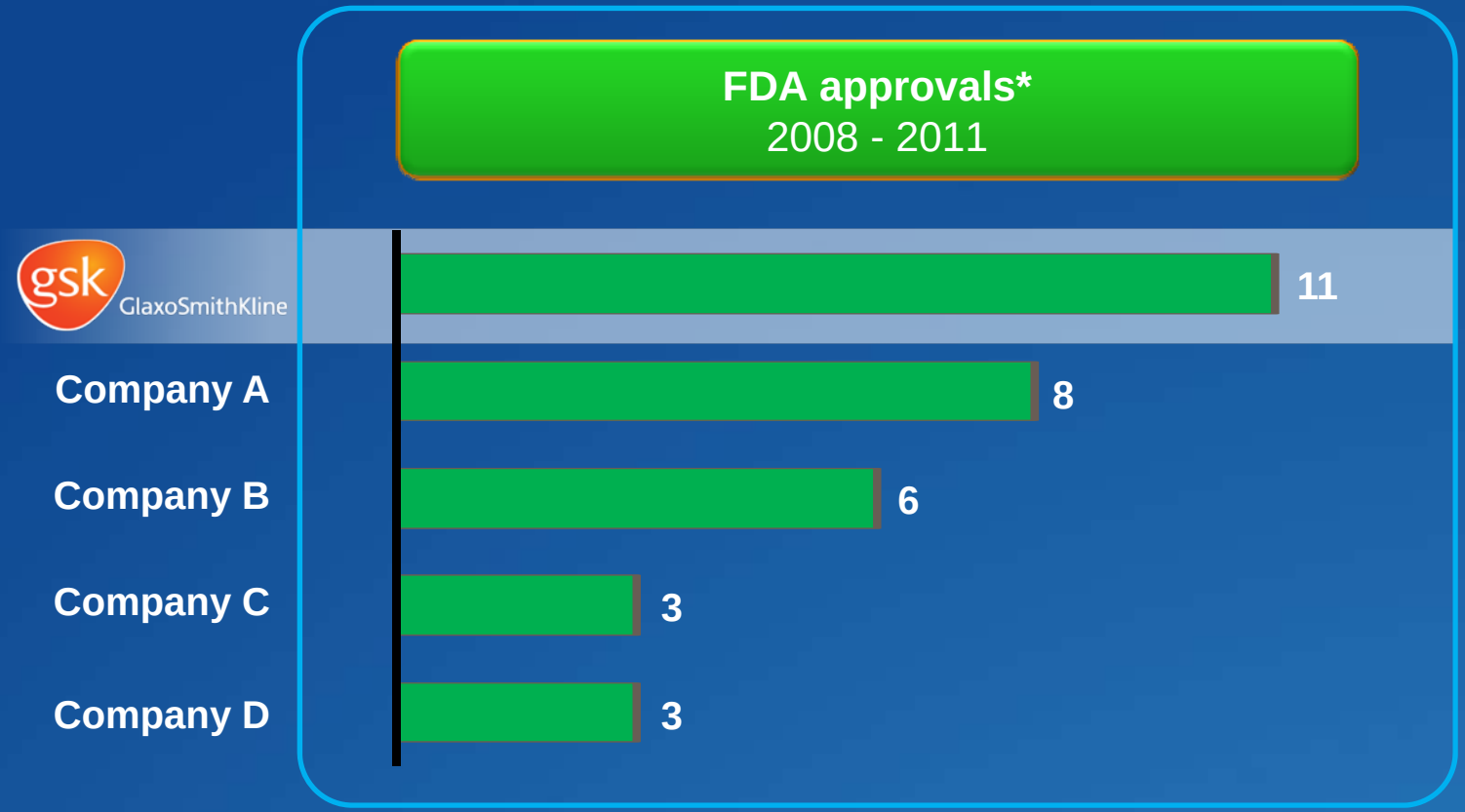
Re-focussed

- Metabolic Pathways
- Infectious Disease
- Respiratory

Grew

- Biopharmaceuticals
- Immuno-Inflammation
- Neurodegeneration
- Oncology

Execution is improving returns



- Highest number of approvals
- Growing a sustainable late-stage pipeline

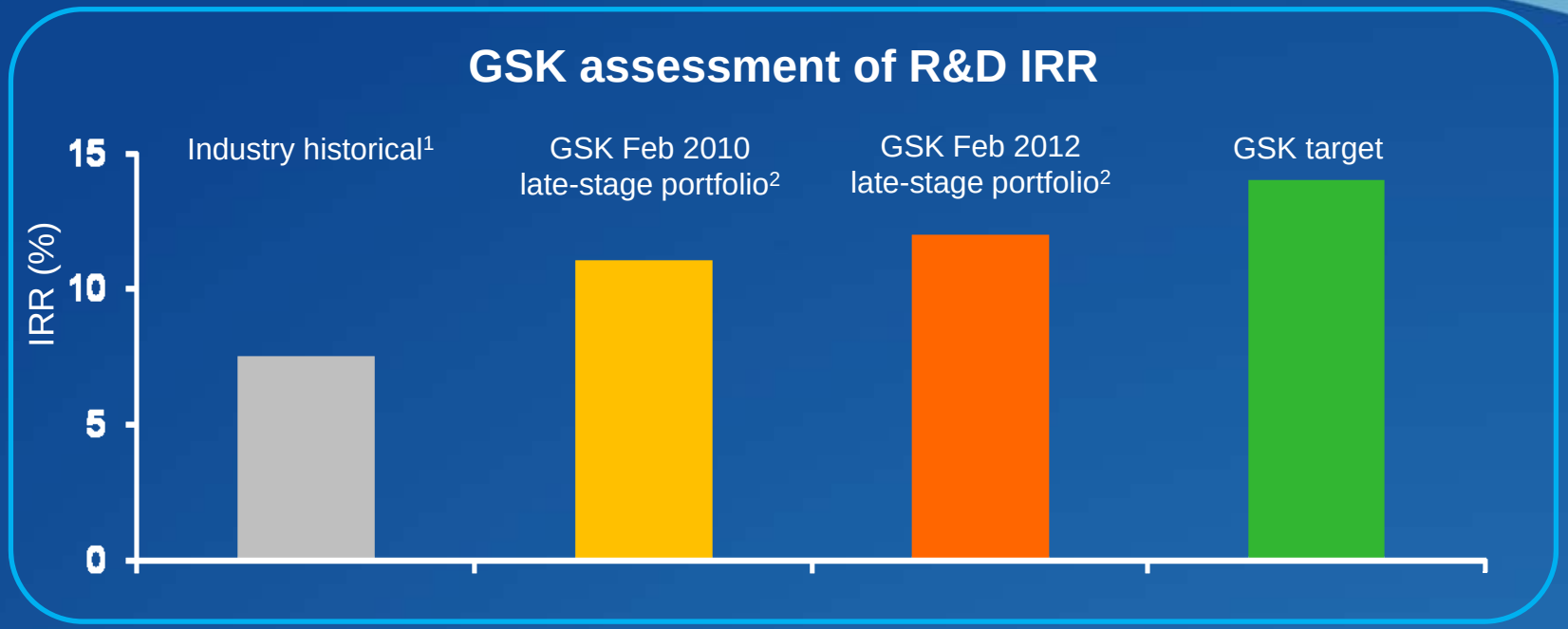
* FDA approvals include NCEs and NBEs
Source: FDA website

Pipeline delivery and visibility continues

- ~30 assets in phase III/registration
- 15 phase III assets with data in 2011-2012
- 5 products with sufficient data in-house to file in 2012
  - Promacta/Revolade, QIV Flu, Relovair, MEK, BRAF
- Phase III expected to complete for 4 additional drugs and vaccines by end 2012
  - albiglutide, dolutegravir, LABA/LAMA, Mosquirix

Since Q4 – BRAF and Relovair asthma have completed with sufficient data to file

Returns on R&D investment increased to 12%; on track to deliver 14% return rate



- Increased risk adjusted sales following positive data
- Some early impact of cost reduction programmes
- Reduced late stage attrition

1. McKinsey, *Nature Reviews, Drug Discovery* (Aug 09) for small molecules. 13% for biopharms
2. Projected rate of return based on investment made to create late stage pipeline & expectations on future sales. Late-stage portfolio includes pharma assets and vaccines launched from 2007 onwards (2010 analysis) and 2009 onwards (2012 analysis) plus phase IIb & III pipeline

GlaxoSmithKline

Patrick Vallance

President, Pharmaceuticals R&D

Drug discovery critical to sustain R&D pipeline delivery

2007

Therapy Area Transformation

2008

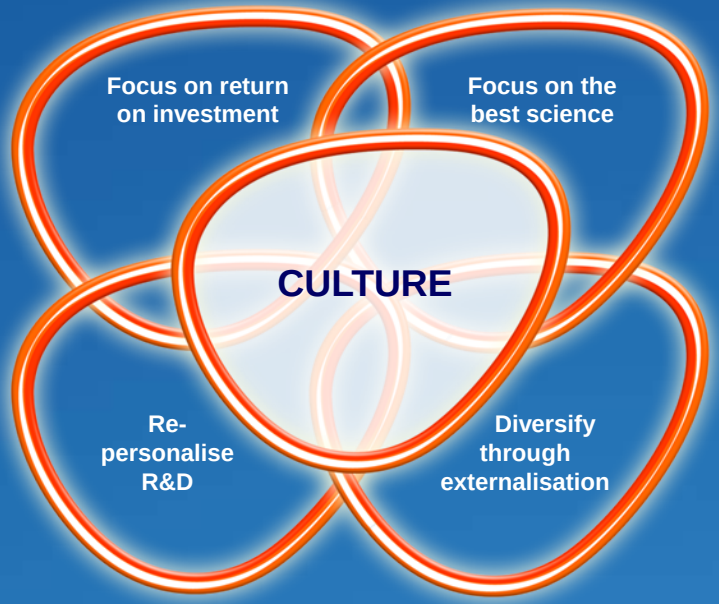
Business plans endorsed by DIB and DPU/BDUs created

2011

End of first cycle – refresh and or confirm direction

2012

Start new business cycle



DPU approach to Drug Discovery is delivering

38 → 40

Extensive review completed Q4 2011

4 DPUs created

3 DPUs closed

6 DPUs with >20% increased investment

5 DPUs with >20% decreased investment

Overall Drug Discovery budget unchanged

Investment has been rebalanced according to scientific opportunity

gsk GlaxoSmithKline Oncology

Respiratory

ID INFECTIOUS DISEASES MEDICINES DISCOVERY & DEVELOPMENT

immuno inflammation

Dermatology

gsk GlaxoSmithKline R&D China 葛兰素史克中国研发中心

Healthy Hearts Beating With Dignity
MPC
Metabolic Pathways and Cardiovascular Unit

Alternative Discovery & Development

biopharmr&d

R&D pipeline promise: will it deliver?

Late stage visibility

~30 assets in phase III/registration

15 phase III assets with data in 2011-2012

5 products with sufficient data in-house to file in 2012

Phase III expected to complete for 4 additional drugs and vaccines by end 2012

Mid stage flow & decision gate

Up to 30 C2MDs expected in 2012-2014

Rigorous decision making to reduce attrition

Focus on medicines that will make a difference

Early stage sustainability

40 DPUs & >50 external discovery engines

Leadership/Talent/Culture

>20 publications in Nature and NEJM

Since Q4 – BRAF and Relovair asthma have completed with sufficient data to file

Immuno-inflammation

Respiratory

Biopharm

Alternative Discovery & Development

Oncology

Metabolic Pathways & Cardiovascular

Pattern Recognition Receptor (PRR) DPU

John Bertin, Ph.D.

Pioneer and expert in PRR Biology

At GSK since 2008

Biotech experience at Synta and Millennium Pharmaceuticals (Boston, USA)

Located in Philadelphia, USA

Formed in 2008

Team of 55 scientists

Partnered with biotech & academics

Renewed for additional 3 years

- Focused on translating recent discoveries in PRR biology into novel therapeutics for the treatment of autoimmune diseases
- Combining cutting-edge science and drug discovery provides platform that drives innovation and heightened sense of urgency
- DPU has deep scientific expertise in PRR biology and uses innovative thinking to establish leadership positions in drug discovery and clinical utility

Refractory Respiratory Inflammation DPU

Respiratory

Edith Hessel, Ph.D.

Expert in asthma, immunology & oligonucleotide-based therapeutic approaches

At GSK since July 2009

Joined from Dynavax Technologies (California, USA)

Located in Stevenage, UK

DPU refocused in September 2011 to exploit the emerging science of innate immune pathways in COPD

26 scientists in flexible, small & integrated teams; highly external facing with biotech & academic partners

DIB endorsement of innovative strategy

- The time is right to invest in novel target discovery in COPD
  - Great progress in COPD patient knowledge and stratification
  - Will enable more efficient clinical development paths for future COPD medicines
- We changed our target discovery strategy, starting our thinking in the patient
  - Human *in vitro* systems resembling the patient
  - Novel screening platforms to speed up target discovery
  - End-to-end planning incorporating learnings from GSK late stage clinical expertise

Biopharm Discovery

biopharmr&d

Steve Martin, Ph.D.

Protein engineering expert, pharma R&D leader

At GSK since 1994

Joined from the University of Oxford

Multidisciplinary team of 80 scientists located in Stevenage, UK

Created in 2012 from Biopharm Discovery Units formed in 2009

Working in partnership with DPUs across the therapeutic spectrum

DIB endorsed funding for 3 years

- Current focus on monoclonal antibody, recombinant protein and dAb medicines discovery
- New platforms coming online over the next three years to maintain competitive edge
- Previous biopharm discovery units succeeded in delivering clinical candidates and pioneering new technology platforms (2009-2011)
- Evolved following DIB review to simplify and provide cleaner separation of pipeline delivery and technology innovation

Academic DPU

AcDPU
Academic Discovery Performance Unit

Pauline Williams, MD

Translational Medicine Physician

At GSK since 1992

Joined from hospital medicine

Formed in 2009, with a team of 5

Grew in scope and size based on positive mid-term and final DIB reviews

Now an international team of 19

Remit extended globally and into earlier discovery

- Cross-therapeutic unit with a diverse portfolio of GSK and academic-borne medicines
- Small, agile team, with personal accountability
  - Funding flexibility + devolved decision-making → opportunistic
  - Testing different models of academic engagement and shared risk/reward
- Focus is on individual academics and not institutions
- Delivered 1 medicine to late stage development in 2011. Objective is to deliver 2 more in 2012-2014

Protein Dynamics DPU

GlaxoSmithKline Oncology

Carolyn A. Buser, Ph.D.

Pharmaceutical Oncology
R&D & translational Science

At GSK since March 2011

Joined from Cancer Research, Merck & Co.

Co-localised with Cancer Research DPUs in Upper Providence, PA

Formed in 1Q2010; Team of 35 members

Partnered with biotech, precompetitive consortia and academia

Funded until interim review in 1H2013

- DPU focus: Leverage emerging science to modulate expression and function of oncogenes and tumour suppressors
  - Defined patient populations for treatment
- DPU differentiation: Focus on target class with depth and breadth to determine chemical and biological tractability of target class through internal efforts and partnerships
- DIB implementation: Milestone-driven investment into novel target area with recognized therapeutic potential in cancer and other diseases

Heart Failure DPU

John Lepore, MD

Cardiologist,
physician-scientist

At GSK since 2006

Joined GSK from faculty
position at the University of Pennsylvania

An integrated, co-localised team
located in Upper Merion, PA

Formed in 2008

Team of 60 scientists and clinicians

Funding extended for additional 3 years
at last DIB review

- Building on existing expertise form ground breaking carvedilol (Coreg) programme
- Leveraging emerging science to translate novel mechanisms into next generation therapies:
  - inhibiting pulmonary edema formation (e.g. TRPV4 blockers)
  - blocking hypertrophic signaling pathways
  - improving cardiac metabolism
- Pursuing novel CV indications for existing GSK molecules:
  - losmapimod, p38 inhibitor for acute coronary syndrome

GlaxoSmithKline

Reference Slide: Methodology to estimate the IRR of GSK R&D's late-stage pipeline

Estimated Sales

- Late-stage pipeline includes pharma NCEs and vaccines launched from 2009 onwards plus current phase IIb & III pipeline. (Sales taken from 2009 in order to match the R&D costs from 2003 onwards).
- Actual sales 2009-11 for products launched since '09.
- Estimated future sales for all products through 2032.
- Future sales estimates include risk-adjustment which is inline with current industry attrition rates.

Key Financial Assumptions

- Forecast operating profit margins after deduction of CoGS, selling and marketing and direct administration costs. Estimates are similar to current margin ratios.
- Includes estimates of capital investments and working capital requirements.
- Includes the Group estimated tax rates.

R&D Costs

- R&D costs associated with the development of our current late-stage pipeline projects are included (including the costs of failed assets as well as infrastructure costs).
- For pharma, the following approach was used:
  - Total R&D costs split proportionately into early-stage (pre-CS), mid-stage (CS-C2MD) and late-stage (C2MD to launch).
  - In order to allocate all costs for this set of projects (e.g. late-stage pipeline) as accurately as possible, costs were included as follows:
    - 2003-05: All early-stage and 50% mid-stage costs.
    - 2006-09: All mid-stage and all late-stage costs excluding PLE and market support.
    - 2010 and beyond: All late-stage cost estimates for the assets which are included in the sales projections, and estimates for increasing regulatory support.
  - Actual upfront and milestone payments for in-licensed assets, as well as estimates for future milestone payments, were also included.
- For vaccines, a similar approach was used.

CS = Candidate Selection; C2MD = Commit to Medicines Development

The methodology above was applied to estimate the annual net cash flows used to derive the estimated IRR%