

半导体芯片研发的创新管理

西门子数字化高级咨询顾问：彭旭



Agenda



创新是半导体行业的永恒旋律

西门子提供无与伦比的半导体芯片研发创新管理解决方案

总结

Agenda

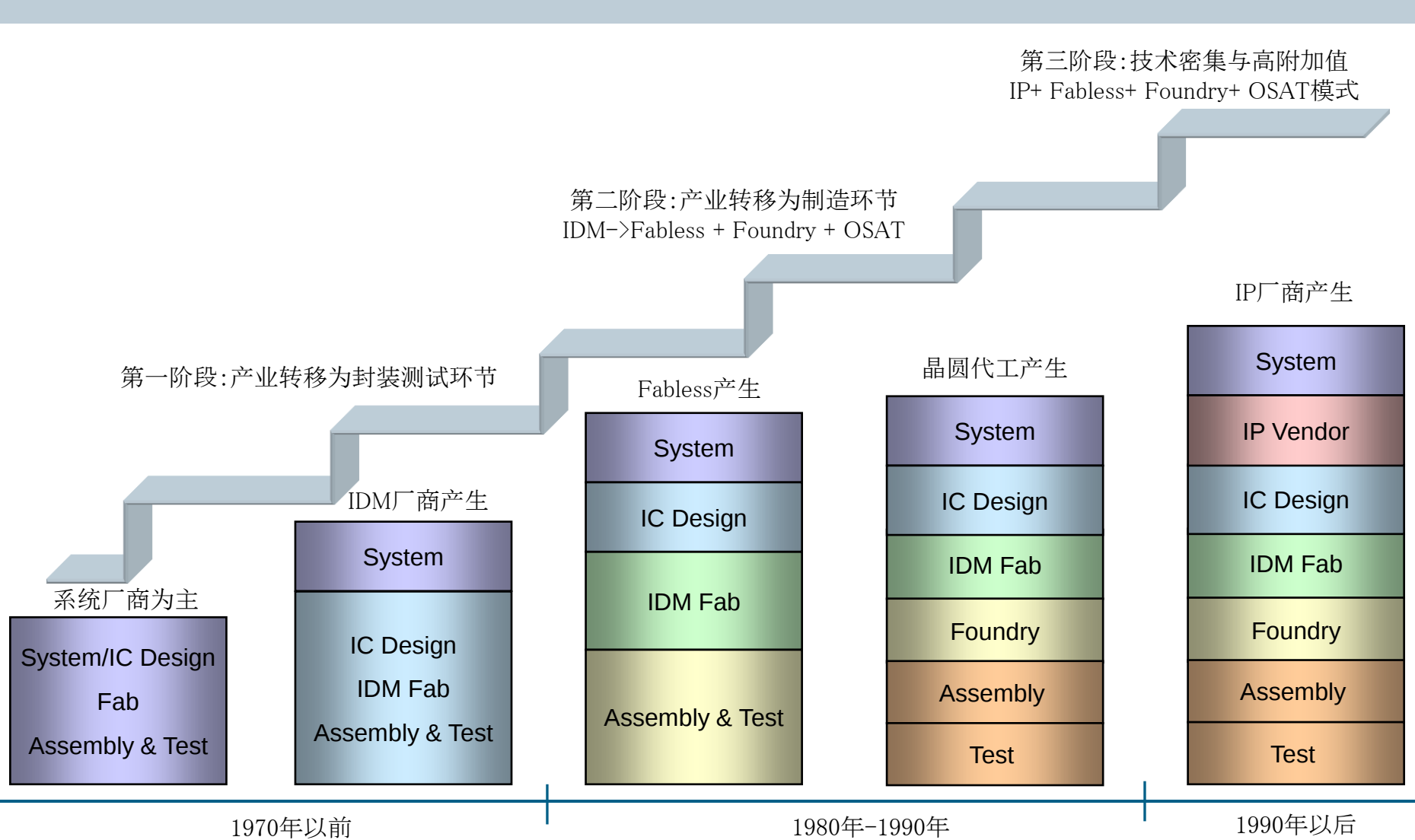


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半导体行业发展历程及中国半导体的“雁行”机遇



- 中国的半导体正在经历产业转移中的第一和第二阶段, 封测业和制造业在向国内转移的趋势已经确定
- 中国制造业的整机品牌崛起, 带来对上游芯片的旺盛需求
- 国家战略催生半导体行业 and 新技术发展

而新的机遇和工业4.0技术推动半导体产业及中国半导体企业创新及变局

机遇与挑战并存



- 工业以太网的建设需要支持多协议的通信芯片
- 智能机床和机器人需要高性能、低功耗、安全性的芯片产品支持
- 工业4.0高集成度促使半导体供应商开始将MCU与传感器加以整合

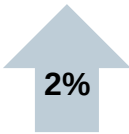


其中需求的多变性和新技术发展导致半导体企业开发新一代IC技术的成本越来越高

Top Semiconductor R&D Spenders (Companies with ≥\$1B in Spending)

2015 Rank	2014 Rank	Company	Region	IDM	FABLESS	FOUNDRY	2014			2015			2015/2014 % Change in R&D
							Semi Sales (\$M)	R&D Exp (\$M)	R&D/Sales (%)	Semi Sales (\$M)	R&D Exp (\$M)	R&D/Sales (%)	
1	1	Intel	Americas	•			51,400	11,537	22.4%	50,494	12,128	24.0%	5%
2	2	Qualcomm	Americas		•		19,291	3,695	19.2%	16,032	3,702	23.1%	0%
3	3	Samsung	Asia-Pac	•			37,810	2,965	7.8%	41,606	3,125	7.5%	5%
4	4	Broadcom	Americas		•		8,428	2,373	28.2%	8,421	2,105	25.0%	-11%
5	5	TSMC	Asia-Pac			•	24,975	1,874	7.5%	26,439	2,068	7.8%	10%
6	7	Micron	Americas	•			16,720	1,598	9.6%	14,816	1,695	11.4%	6%
7	6	Toshiba	Japan	•			11,040	1,853	16.8%	9,734	1,655	17.0%	-11%
8	9	MediaTek	Asia-Pac		•		7,032	1,430	20.3%	6,699	1,460	21.8%	2%
9	12	SK Hynix	Asia-Pac	•			16,286	1,340	8.2%	16,917	1,421	8.4%	6%
10	8	ST	Europe	•			7,384	1,520	20.6%	6,840	1,409	20.6%	-7%
Top 10 Total							200,366	30,185	15.1%	197,998	30,768	15.5%	2%

Source: Company reports, IC Insights' Strategic Reviews database



这些因素加速了半导体企业对创新的渴望和研发创新的持续投入

2015年全球前十大半导体创新新企业

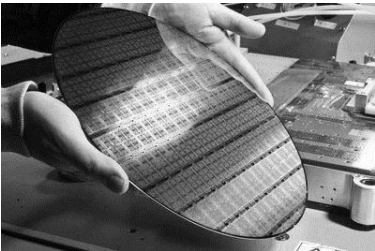
企业	国家
三星电子 (Samsung Electronics)	韩国
京东方科技集团股份有限公司 (BOE)	中国
LG	韩国
华星光电 (Shenzhen China Star Optoelectronics Corp)	中国
东芝 (Toshiba)	日本
台积电 (TSMC)	中国台湾
中芯国际 (SMIC)	中国
IBM	美国
SK海力士 (SK Hynix)	韩国
海洋王照明科技股份有限公司 (Oceans King)	中国

亚洲前十大半导体材料与制程创新企业

企业	国家
三星电子 (Samsung Electronics)	韩国
LG Innotek	韩国
东芝 (Toshiba)	日本
中芯国际 (SMIC)	中国
台积电 (TSMC)	中国台湾
SK海力士 (SK Hynix)	韩国
瑞萨电子 (Renesas Electronics)	日本
Pannasonic	日本
东京电子 (Tokyo Electron)	日本
夏普 (Sharp)	日本



中国半导体产业要从制造中心向创新中心转移，创新设计是必由之路。



资料来源:汤森路透Derwent世界专利索引资料库 (Thomson Reuters Derwent World Patents Index)

但由于半导体行业高技术门槛和高投资导致芯片研发创新充满着失败

45%

DISSATISFIED WITH RETURN
ON INNOVATION SPENDING

Source: IDC



64%

FEEL THEIR EFFORTS TO CONVERT IDEAS TO PRODUCT DEVELOPMENT PROJECTS WERE INEFFECTIVE

Source: Booz & Company Making Ideas Work (2012)



所以，创新是半导体芯片研发成功的关键，而创新管理是帮助半导体企业提高创新回报和实现战略转型的最有效解决方案

SIEMENS



Agenda

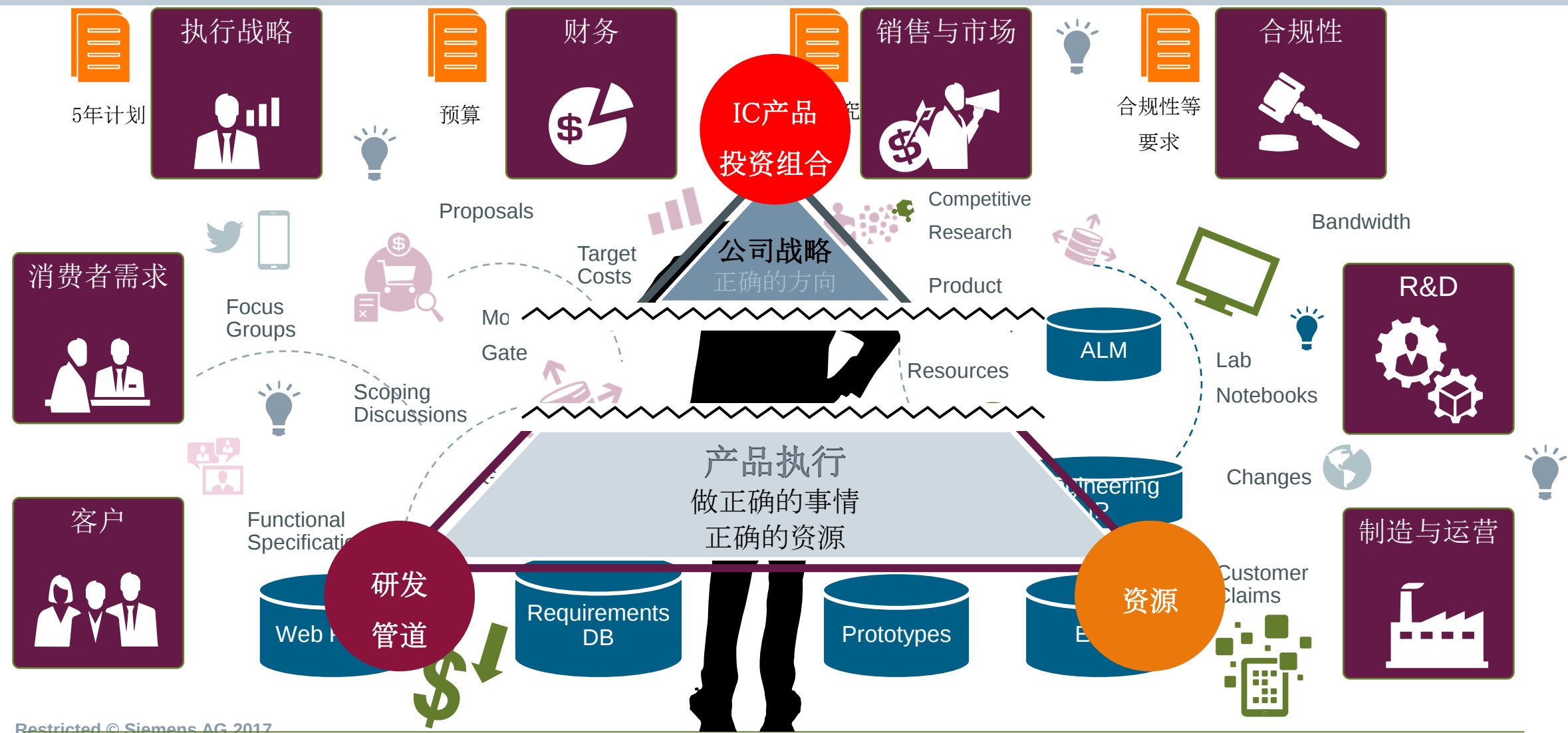


创新是半导体行业的永恒旋律

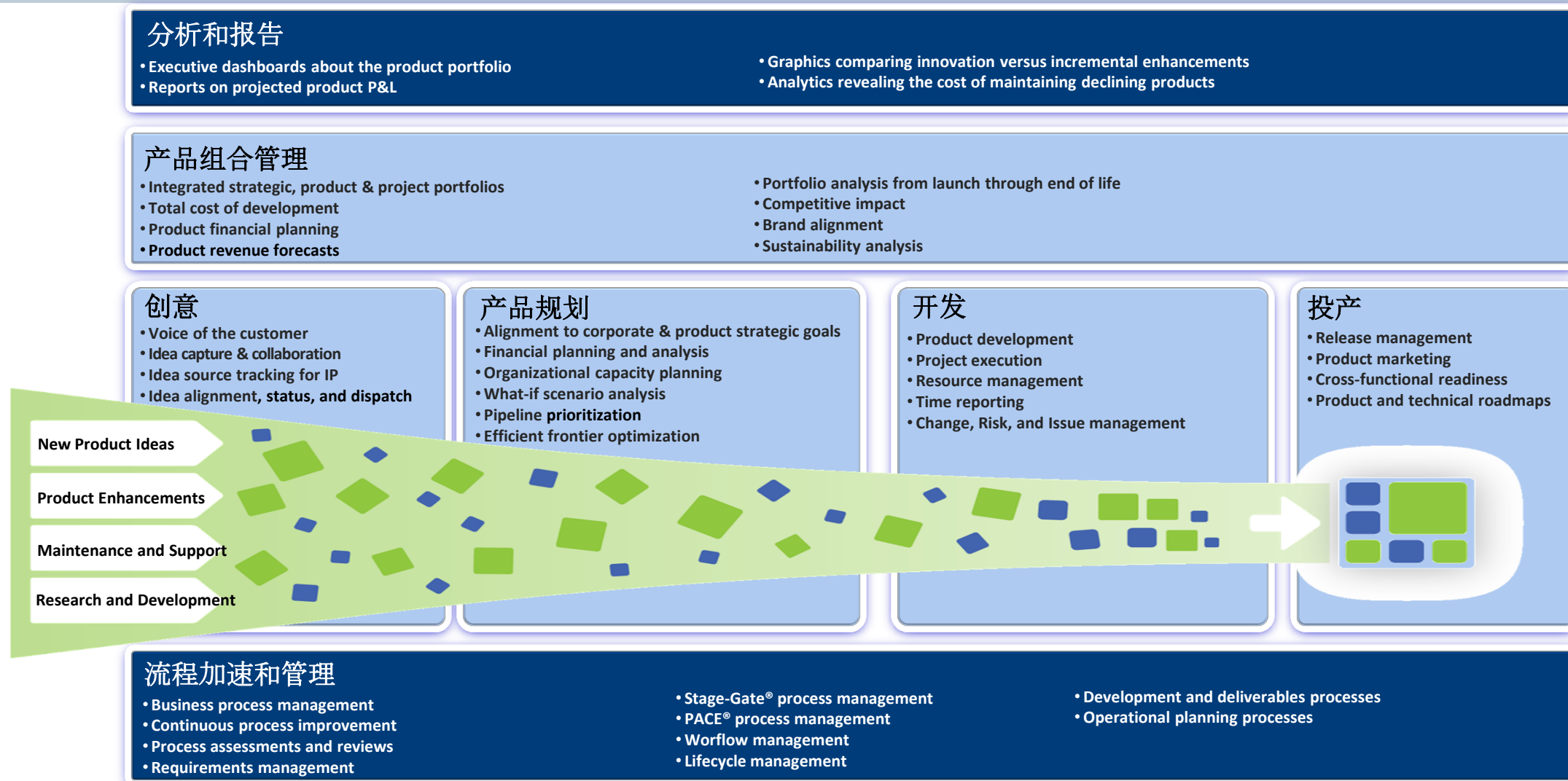
西门子提供无与伦比的半导体芯片研发创新管理解决方案

总结

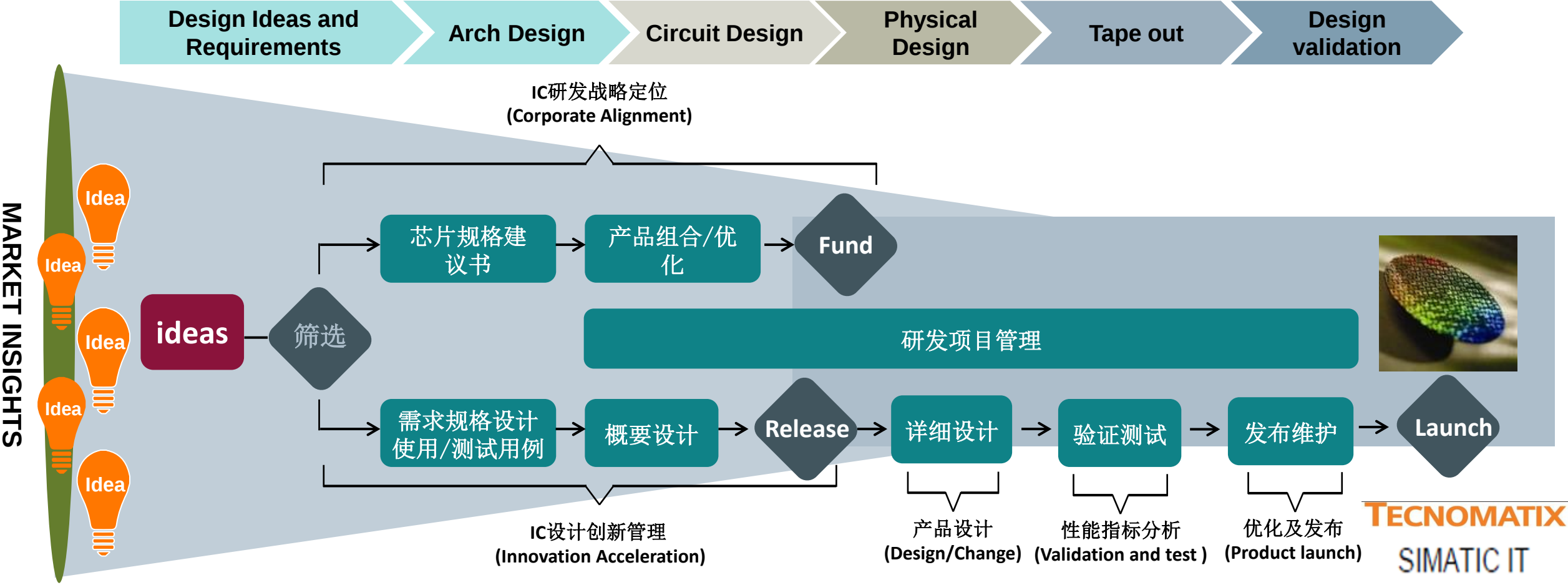
西门子创新管理解决方案帮助半导体企业在一个完整的平台上完成产品的研发创新



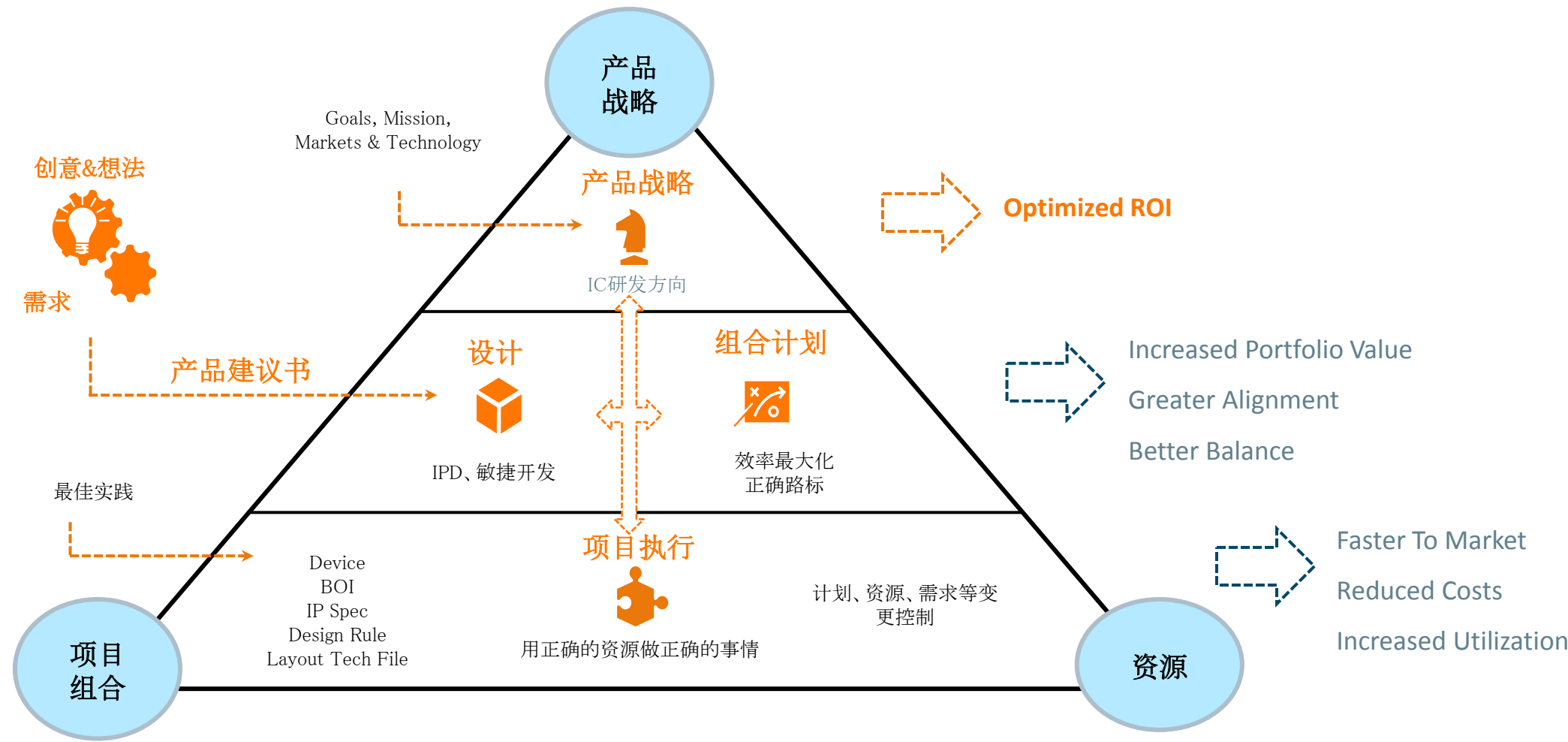
西门子半导体行业研发创新管理解决方案架构

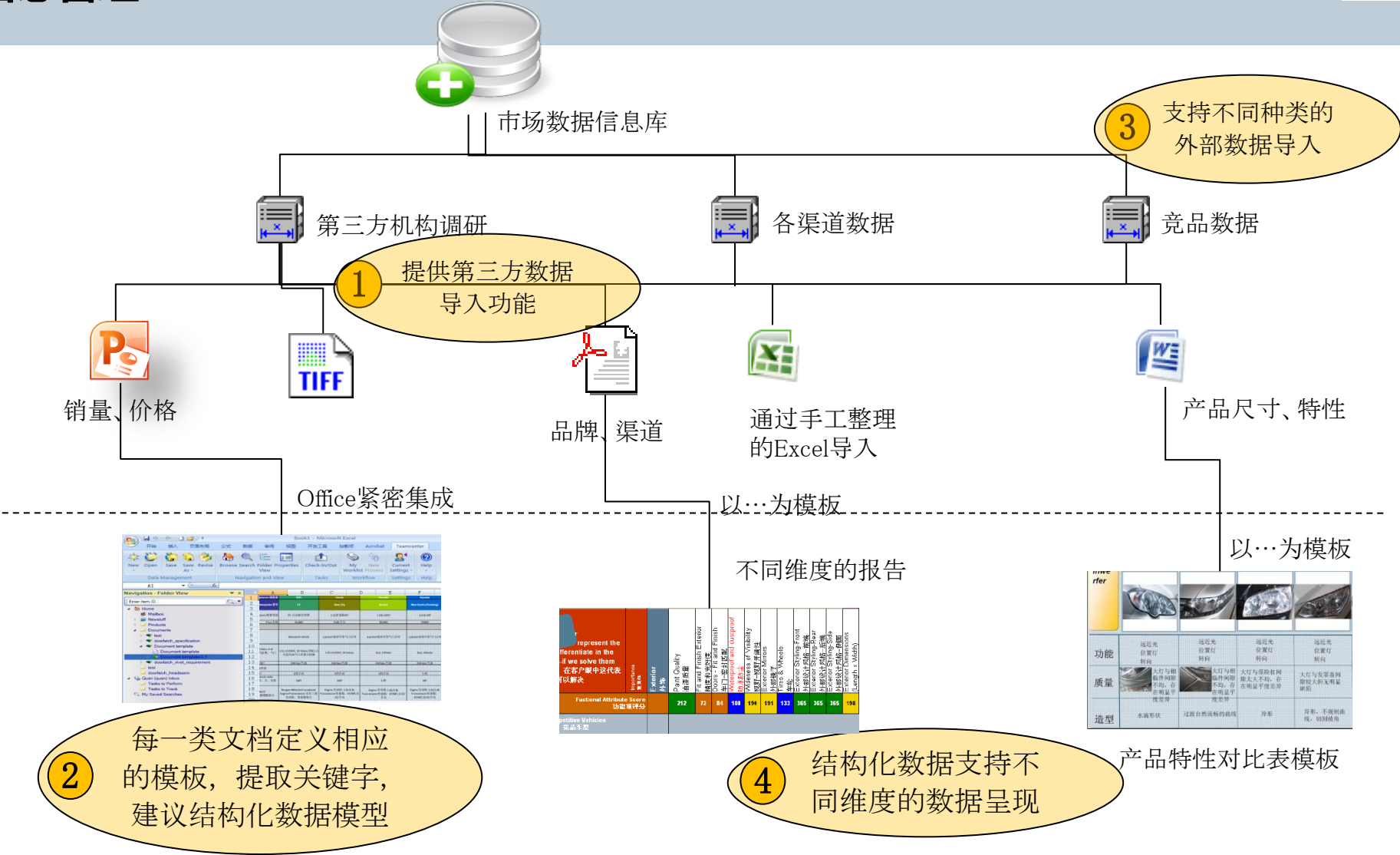


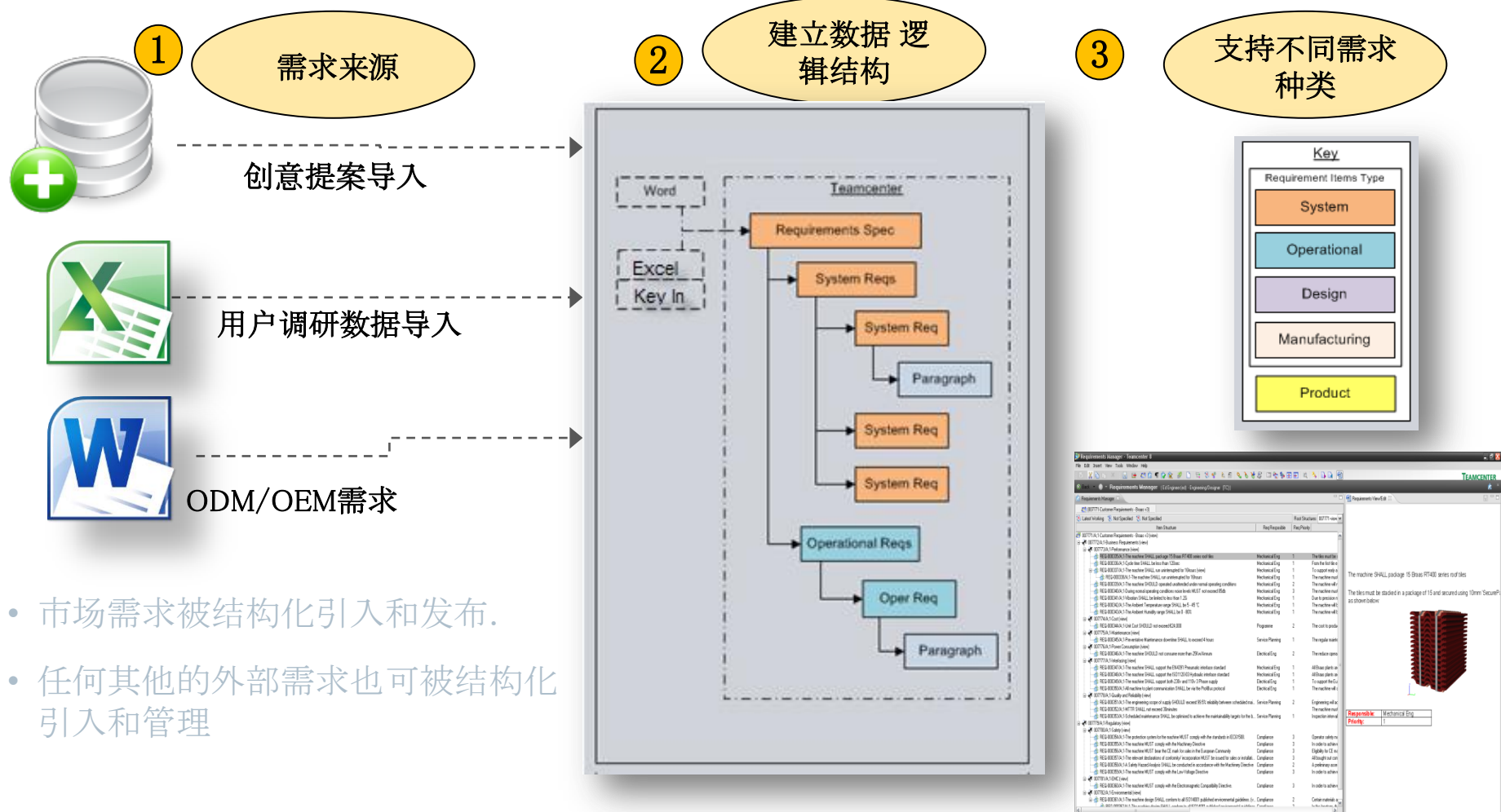
而端到端的创新管理流程架构将加速半导体芯片的研发创新



从而提升半导体企业创新投资回报率

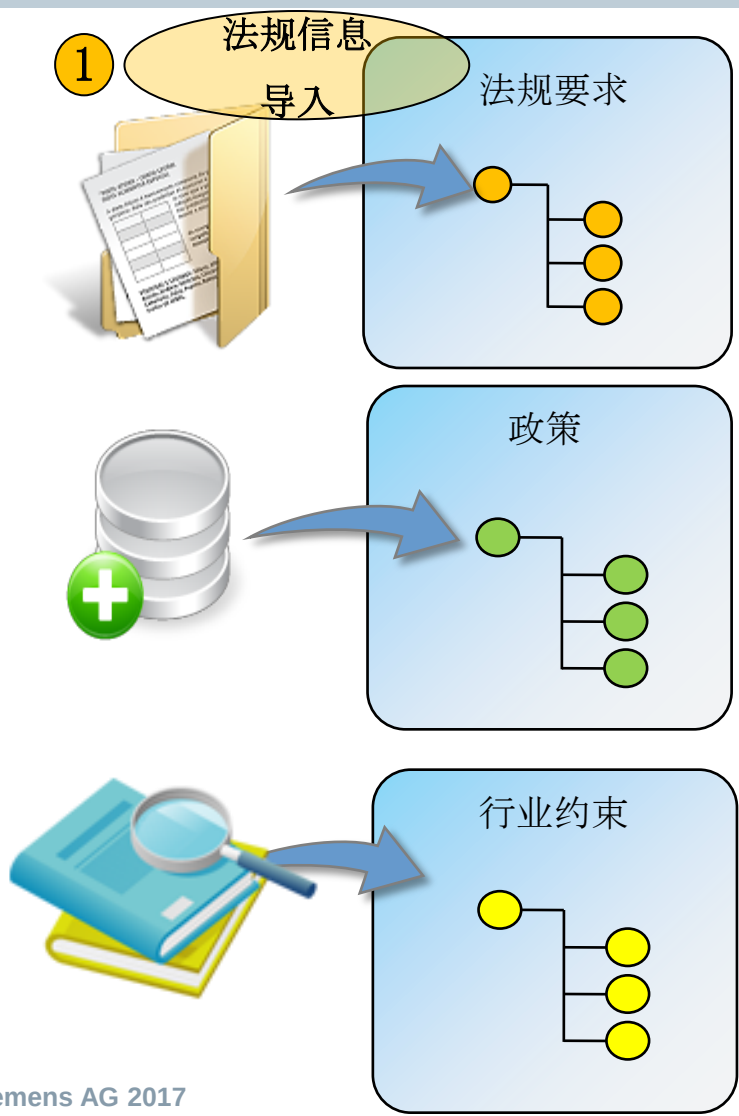






- 市场需求被结构化引入和发布.
- 任何其他的外部需求也可被结构化引入和管理

示例



2 法规、政策要求库

- REQ-000249-EU
- REQ-000259-Emissions
- REQ-000179- Electrical
- REQ-000222-Monitoring
- REQ-000239-Test Cycles and Fuels
- REQ-000260-Recyclability and Recoverability
- REQ-000178- Mechanical
- REQ-000168-General
- REQ-000170-Size
- REQ-000181-Connections
- REQ-000203- Boost
- REQ-000238-Tier 4 Standards
- REQ-000250-Background
- REQ-000261-Restricted Materials
- REQ-000169- Power
- REQ-000191-Communication Rate
- REQ-000192-Monitoring

3 多种方式查询

查询竞品图片

国家:

名称:

品牌:

子品牌:

车种:

内外饰:

外饰局部:

内饰局部:

角度:

备注:

前视图
后视图
侧视图
前侧视图
后侧视图

Cutting Diameter D1 010.000 - 020.000 mm

of Cutting Edges N1 04 1 06

Flute Direction N2 L Left

Tool Material ID MT

Tool Material Name MN

Corner Radius R1 mm

L1 >= 010.000 mm

L2 < 100.000 mm

Diameter of Clearance Rotation D3 mm

Morse Taper Shank Type MKF

Morse Taper Shank Size MKG

Group of Tool Application GA

Center Cutting CC

Perishable PD

Identifies Tool ITA

Description M1

Comments M2

Order: # Catalog# M3

Ver: Home 搜索

Keyword Search

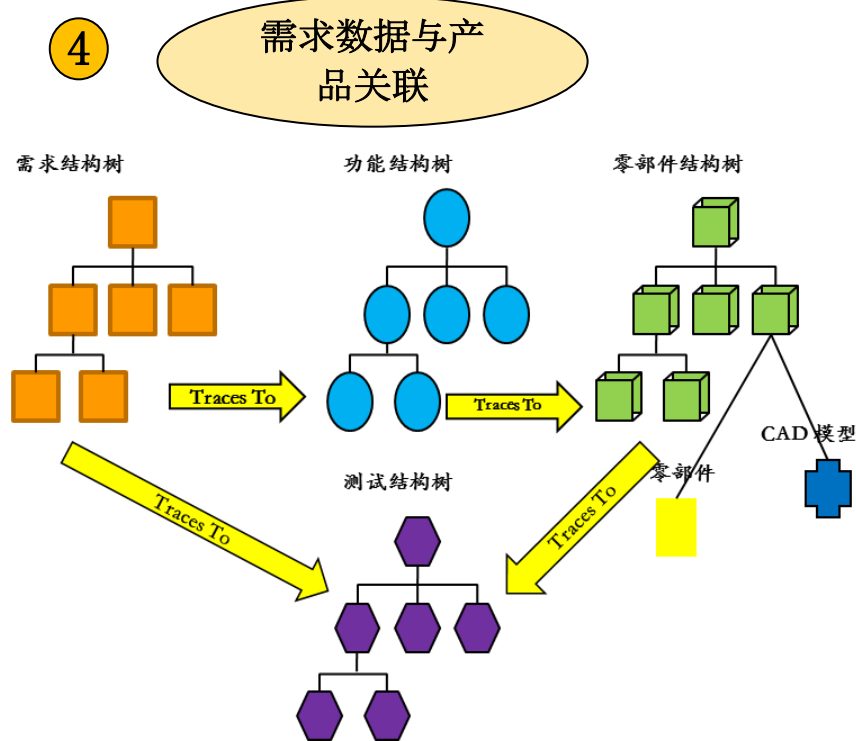
The "Keyword Search" command searches meta-data of indexed types via Teamcenter and contents of dataset files via a full-text search engine.

关键字:

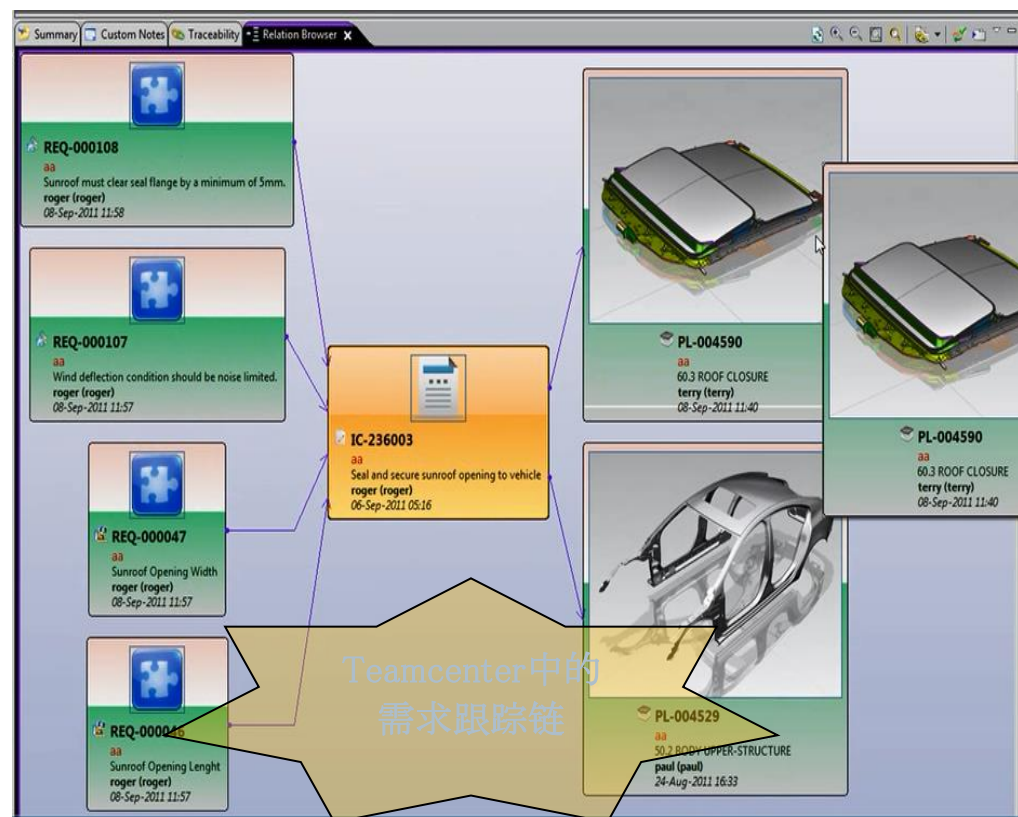
创新管理关键解决方案 需求与产品设计结果的关联

SIEMENS

示例



将需求与产品定义和产品开发过程各环节关联起来, 实现对整个生命周期需求的追溯, 建立需求到产品的关联, 确保需求的实现和产品到需求的追溯



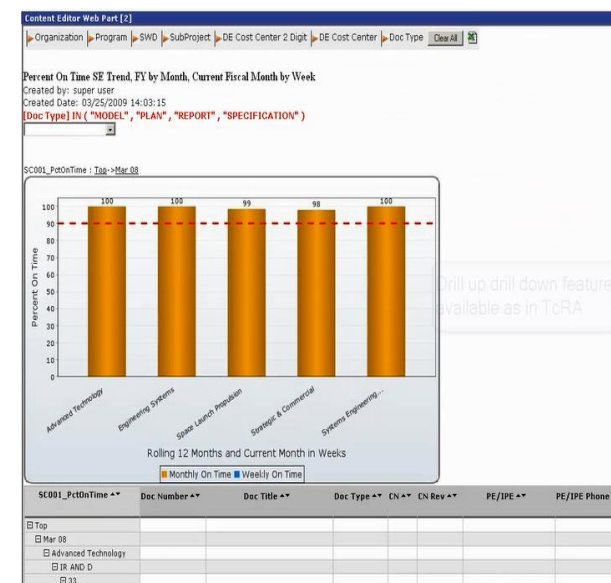
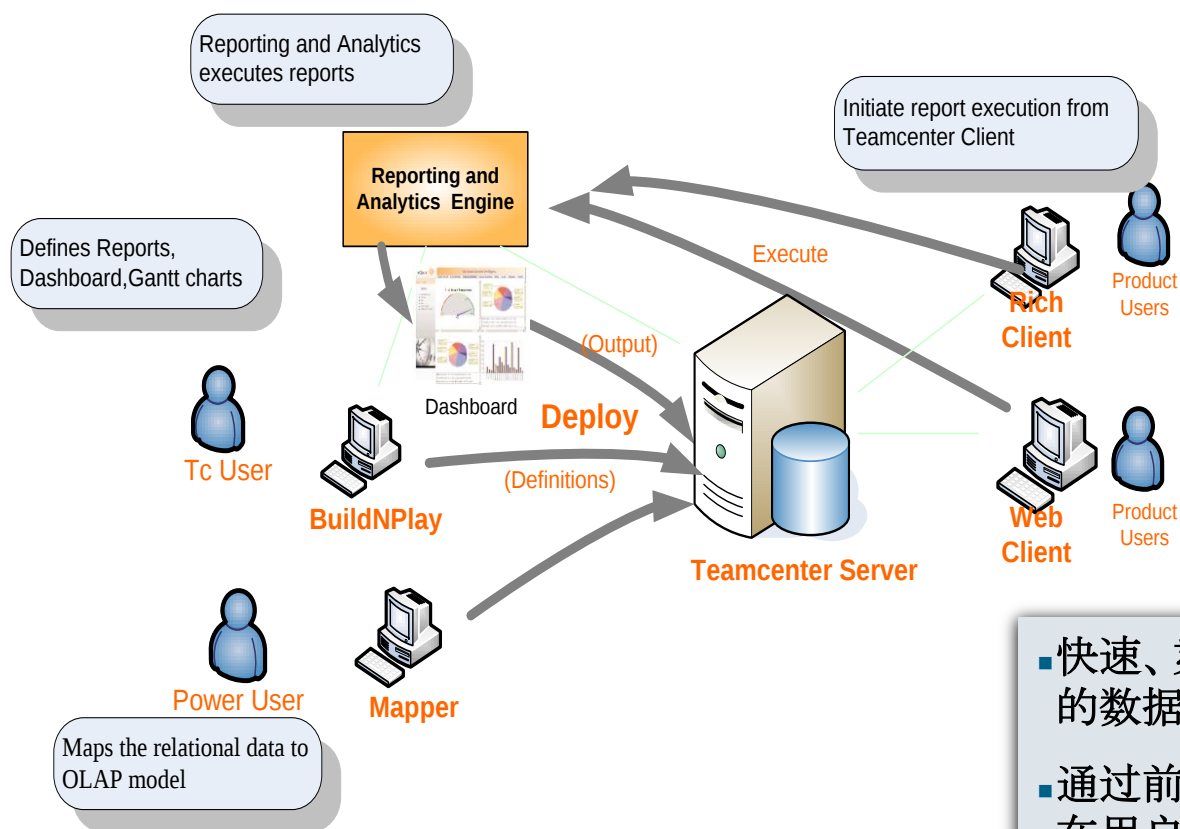
创新管理关键解决方案

需求管理数据挖掘、分析、追踪与报表统计

SIEMENS

示例

Teamcenter Reporting & Analytics



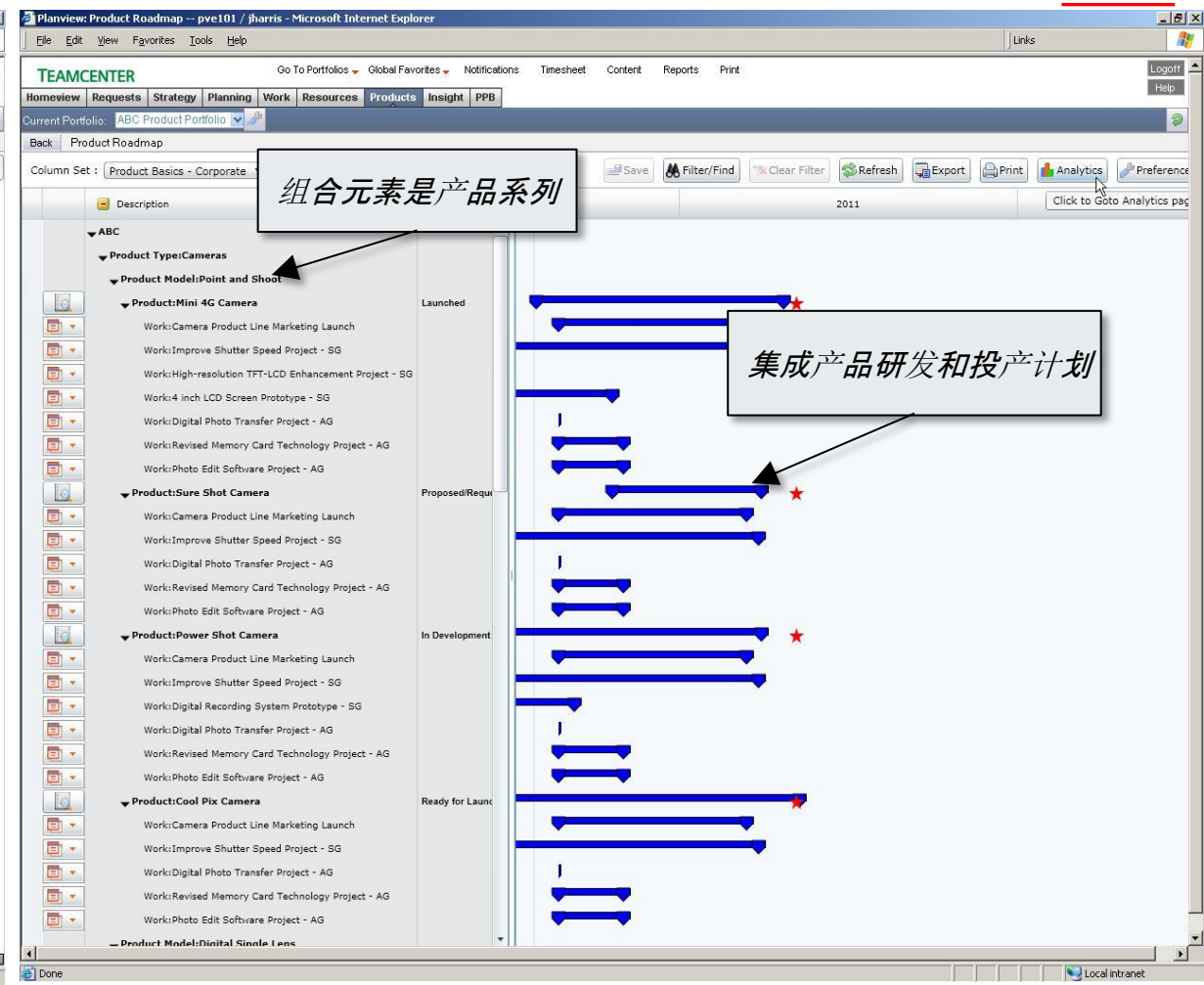
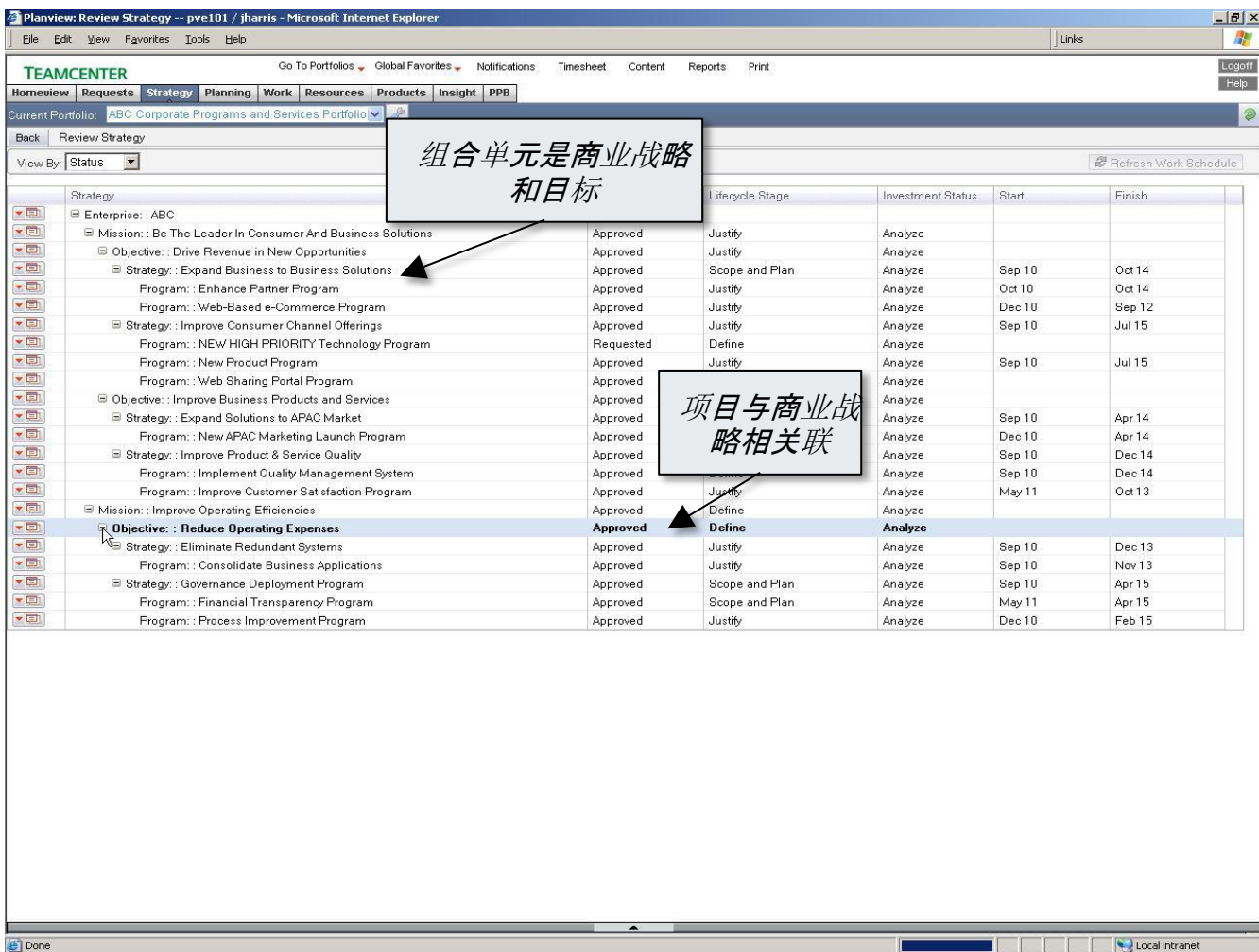
- 快速、灵活地进行复杂关系的、大数据量的、按需提取的数据复杂查询处理
- 通过前台分析工具，将查询报表、统计分析、结论展现在用户面前
- 灵活扩展报表格式，不依赖于IT的开发

创新管理关键解决方案

基于商业计划和产品线的战略规划



示例



创新管理关键解决方案

产品组合分析和选择-财务管理/投资优化分析

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财务管理

Planview: Strategy Financial Planning Summary -- pve101 / jharris - Microsoft Internet Explorer

TEAMCENTER

Go To Portfolios Global Favorites Notifications Timesheet Content Reports Print

Homeview Requests Strategy Planning Work Resources Products Insight PPB

Current Portfolio: ABC Corporate Programs and Services Portfolio

Back Strategy Financial Planning Summary

Model and Working Version ABC Strategic Financial Plan Model - 10.0 : Baseline [Marked As Baseline]

Currency USD Refresh

Column Set Strategic Planning - Cost/Benefit Variance Level Totals Filter By Description Go Clear Export/Print

Description	ID	Allocation	Projected Benefits	Projected Costs	Year 1 Projected Cost	Year 2 Projected Cost	Yearly Cost Variance	Labor Cost	Capital Costs
Enterprise: ABC									
Mission: Be The Leader In Consumer Av	455		93,463,065	127,377,478	28,047,658	34,355,342	(6,307,684)	71,080,569	29,810,000
Objective: Drive Revenue in New Op	457		78,243,765	89,092,669	20,044,363	22,902,177	(2,857,814)	52,838,379	19,300,000
Strategy: Expand Business to Bus	463		5,117,550	21,645,876	3,623,076	6,031,123	(2,408,046)	5,426,217	9,300,000
Service: e-Commerce Services	eCom - 001	Apr 2009 - Mar 2014	0	18,588,872	2,609,920	5,261,800	(2,651,680)	3,388,872	8,800,000
Program: Enhance Partner Pro	465		494,400	273,259	96,804	72,976	23,828	205,279	0
Work: Portal Development F	0000076	20.00%	494,400	273,259	96,804	72,976	23,828	205,279	0
Program: Web-Based e-Comm	464		4,623,150	2,783,745	916,352	696,547	219,805	1,832,066	5,000,000
Work: Consumer Web Portal	0000014	35.00%	560,000	437,568	136,998	107,823	29,175	348,071	0
Work: e-Commerce Mainte	0000020	60.00%	1,461,000	932,912	328,608	222,696	105,912	627,926	1,000,000
Work: PARMS Implementa	0000018	25.00%	463,750	441,276	159,094	117,100	41,994	284,101	1,000,000
Work: Portal Development F	0000076	20.00%	494,400	273,259	96,804	72,976	23,828	205,279	0
Work: Vendor e-Commerce	0000015	40.00%	1,644,000	698,732	194,848	175,952	18,896	366,688	1,000,000
Strategy: Improve Consumer Char	460		73,126,215	67,446,792	16,421,286	16,871,054	(449,768)	47,412,162	9,900,000
Program: NEW HIGH PRIORITY	13615		33,554,836	19,304,381	4,957,170	4,844,590	112,580	17,150,499	1,000,000
Work: A NEW HIGH PRIORITY	0000319	100.00%	6,525,000	1,243,160	888,200	354,960	533,240	1,243,160	0
Work: CRM Infrastructure Ph	0000280	25.00%	1,147,500	1,107,246	248,535	301,751	(53,216)	533,496	2,000,000
Work: Customer Order Track	0000073	40.00%	1,972,000	830,896	272,605	211,750	60,854	456,696	1,000,000
Work: Financial System Upg	0000021	20.00%	771,800	386,941	112,708	75,324	37,384	262,341	0
Work: HD Technology Marke	0000390	30.00%	866,601	647,687	162,025	161,613	412	429,429	0
Work: HD Technology Projec	0000090	60.00%	13,650,000	9,511,844	1,943,482	2,285,991	(342,509)	9,096,912	2,000,000
Work: Improve Shutter Spee	0000039	25.00%	5,687,500	4,033,330	907,078	1,121,674	(214,596)	3,922,950	0
Work: Oracle Implementation	0000032	20.00%	767,286	361,515	122,000	79,244	42,756	261,595	0
Work: Purchasing Website Ir	0000074	25.00%	598,750	342,825	101,475	75,675	25,800	243,048	0
Work: Systems Development	0000027	40.00%	1,568,399	838,934	199,062	176,608	22,454	700,872	0
Program: New Product Program	462		34,341,679	21,917,578	5,584,662	5,759,366	(174,705)	20,595,970	6,000,000
Work: Camera Product Line	0000391	10.00%	577,734	431,791	108,016	107,742	274	286,286	0
Work: Digital Photo Transfer	0000052	40.00%	7,100,000	3,938,246	985,282	881,532	103,750	3,836,456	0
Work: Digital Camcorder Tec	0000088	30.00%	5,475,000	3,969,375	903,912	1,068,885	(164,972)	3,855,687	0
Work: Improve Shutter Spee	0000039	25.00%	5,687,500	4,033,330	907,078	1,121,674	(214,596)	3,922,950	0
Work: New Point of Sale Re	0000079	25.00%	1,074,500	492,443	171,723	104,800	66,923	394,995	0
Work: Power Supply Proto	0000044	20.00%	319,720	222,602	89,078	72,812	16,265	122,065	0

投资优化分析

示例

Rank Investments -- pve101 / jharris - Microsoft Internet Explorer

TEAMCENTER

Go To Portfolios Global Favorites Notifications Timesheet Content Reports Print

Logout Help

Homeview Requests Strategy Planning Work Resources Products Insight PPB

Current Portfolio: ABC Corporate Programs and Services Portfolio

Scenario: Run the Business

Back Rank Investments for Run the Business Scenario of ABC Corporate Programs and Services Portfolio

Scenario Change View Target Basis Optimize Investment Priority Matrix Configure Display Calculate

	Investment Status	Total Score	Projected Benefit	Total Cost	Capital Cost	Expense Cost	Total Effort (t)	Total ROI	Total Pay Per
Measurement Targets									
		57,000,000	79,500,000	41,500,000	38,000,000	52.7			
		53,967,326	31,803,651	16,133,407	15,670,244	51.2		69.7%	Jan 201
		-3,032,674	47,696,349	25,366,593	22,329,756	1.6			
		52,049,989	42,267,445	20,621,582	21,645,863	40.8		23.1%	Jun 201
Accepted Investments (9)									
1. Accounts Payable Service	Accept	7.50	0	10,375,000	5,450,000	4,925,000	2.3	-100.0%	
2. GL Service	Accept	7.50	0	3,343,116	1,576,170	1,766,946	18.1	-100.0%	
3. Sales Force Automation Service	Accept	6.75	0	10,800,000	5,400,000	5,400,000	6.7	-100.0%	
4. Consolidate Business Applications	Accept	6.25	14,849,475	2,845,564	1,410,413	1,435,151	5.3	421.9%	Sep 21
5. Enhance Partner Program	Accept	6.25	272,019	55,298	24,678	30,620	0.1	391.9%	Oct 21
6. Web-Based e-Commerce Program	Accept	5.25	2,831,805	684,494	3	0	1.1	313.7%	Oct 21
7. Web Sharing Portal Program	Accept	4.15	3,248,437	687,524	3	0	1.3	386.6%	Sep 21
8. New Product Program	Accept	3.15	22,634,557	1,178,202	4	0	12.8	1,821.1%	Mar 21
9. Financial Transparency Program	Accept	2.15	10,131,033	1,854,454	1.1	0	3.5	446.3%	Sep 21
Total:		53,967,326	31,803,651	16,133,407	15,670,244	51.2		69.7%	Jan 21
Investments in Analysis (8)									
1. NEW HIGH PRIORITY Technology Program	Analyze	6.00	27,559,384	1,714,892	785,101	929,791	10.6	1,507.1%	Apr 21
2. Payroll Services	Analyze	5.25	0	13,288,807	4,563,746	8,725,061	13.0	-100.0%	
3. Process Improvement Program	Analyze	5.00	11,869,261	2,612,288	1,405,692	1,206,595	3.6	354.4%	Oct 21
4. Improve Customer Satisfaction Program	Analyze	4.75	7,176,715	1,163,773	518,230	645,543	2.2	516.7%	Jun 21
5. HR Services	Analyze	2.65	0	12,001,639	6,962,897	5,038,742	7.0	-100.0%	
6. New APAC Marketing Launch Program	Analyze	1.90	4,609,453	963,706	308,071	655,635	0.9	378.3%	Aug 21
7. e-Commerce Services	Analyze	1.65	0	10,450,000	6,050,000	4,400,000	3.2	-100.0%	
8. Implement Quality Management System	Analyze	1.15	835,177	72,340	27,844	44,496	0.2	1,054.5%	Mar 21
Total:		52,049,989	42,267,445	20,621,582	21,645,863	40.8		23.1%	Jun 21
Refused Investments (0)									
		0	0	0	0	0.0		0.0%	

组合元素可能是业务举措, 项目或产品

资源需求

财务分项-组合总体

Done

Local intranet

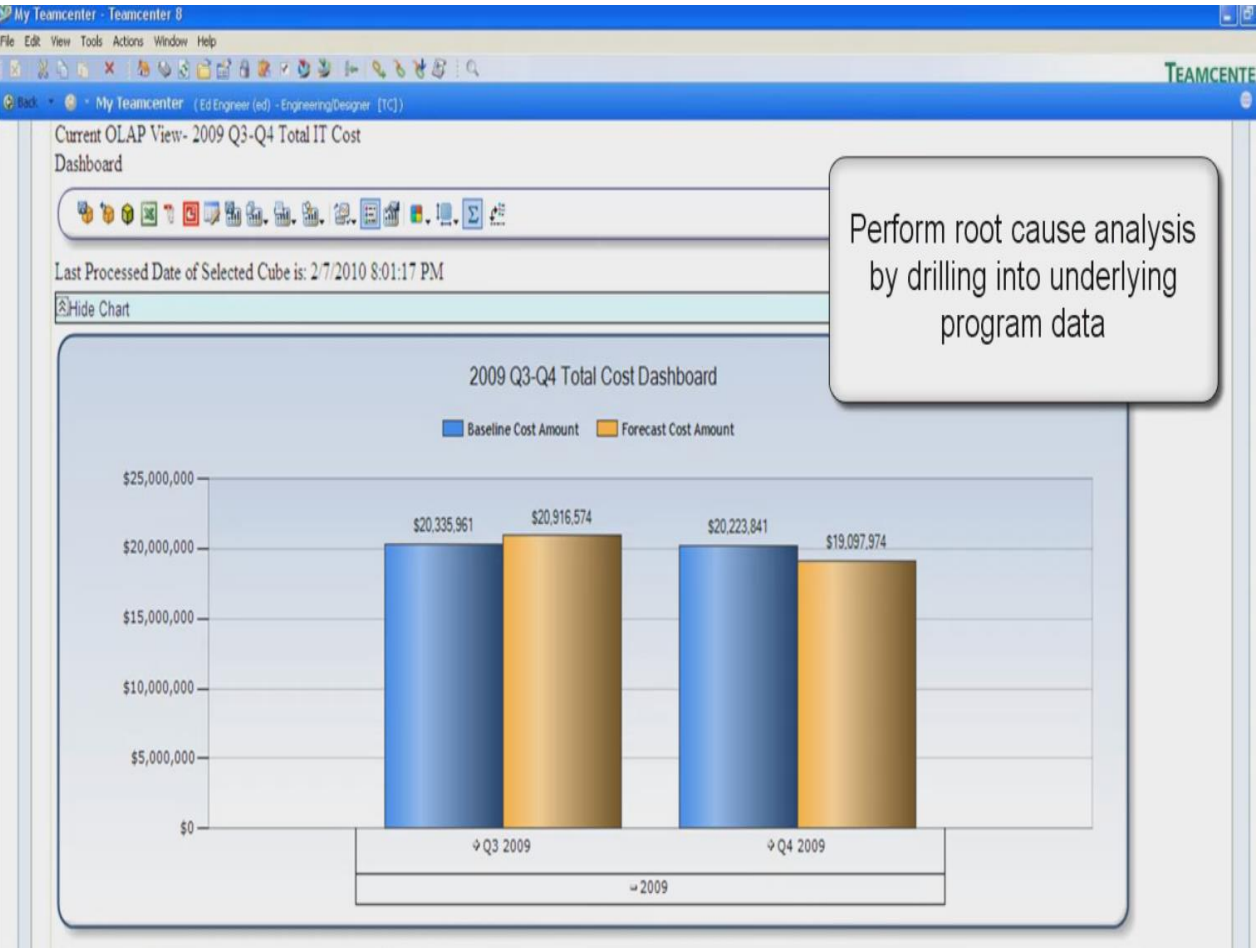
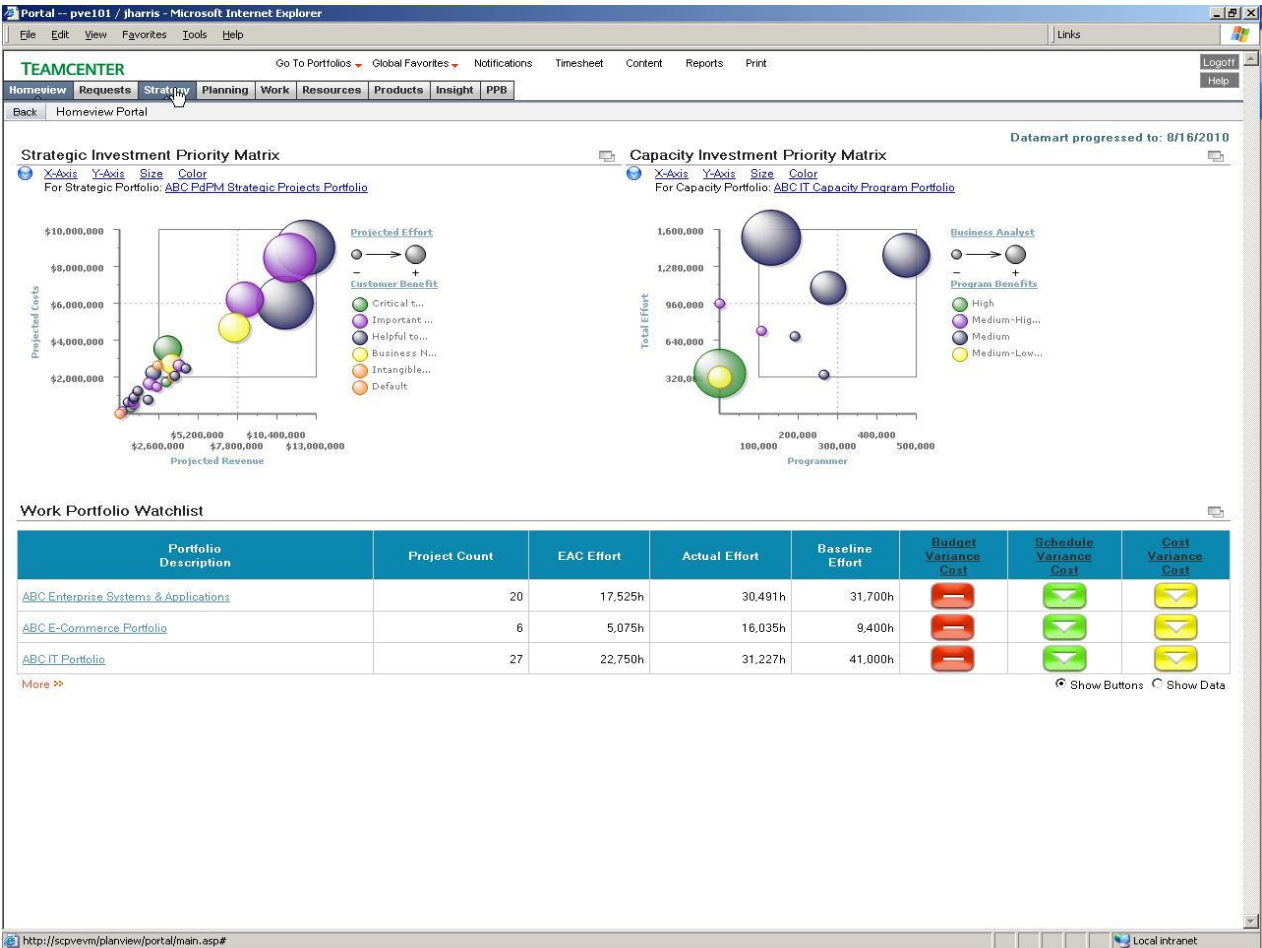
创新管理关键解决方案

绩效分析-投资组合



提供可配置的仪表板

示例



Agenda

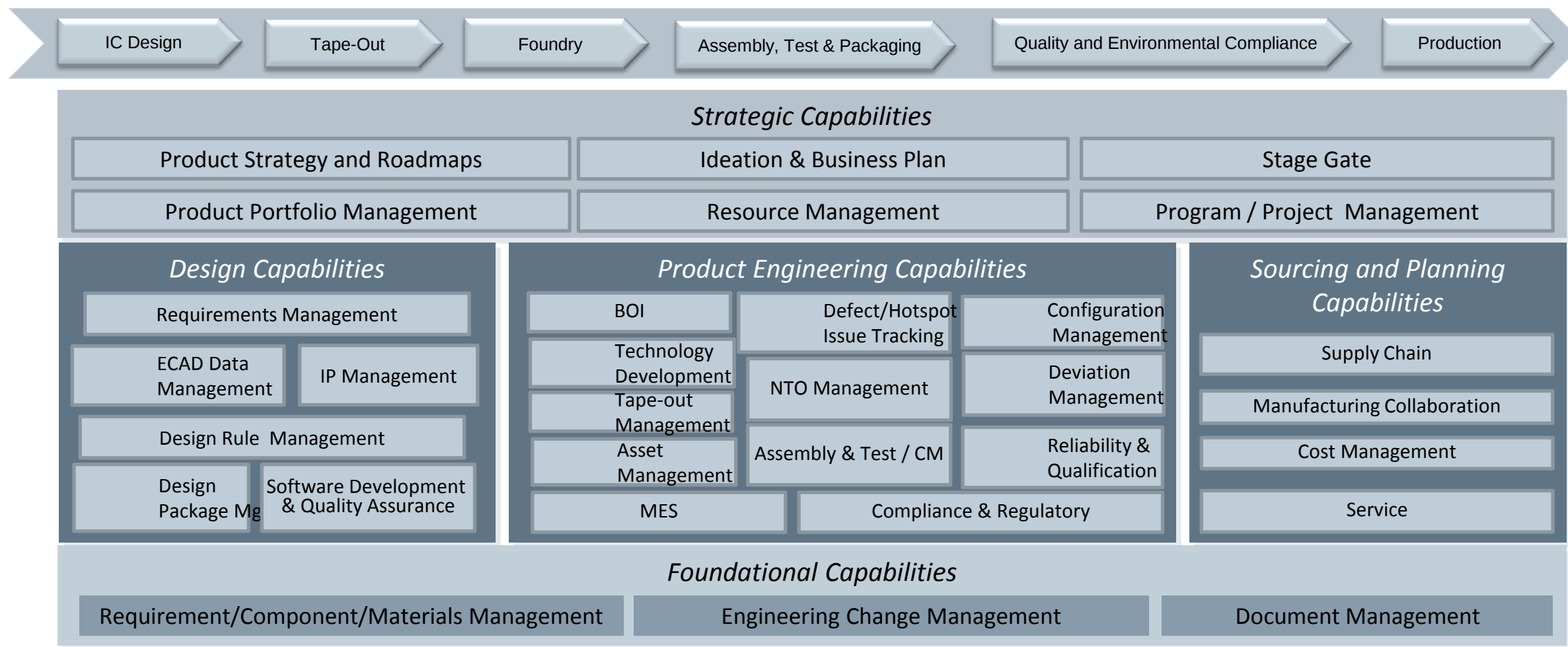


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总结

西门子完整端到端的创新及数字化生命周期管理解决方案助半导体芯片研发实现创新



总体规划、分步实施、试点先行、稳步推进

并通过创新管理解决方案提高半导体芯片研发的创新回报和企业战略转型

- 多渠道捕获创意及识别业务机会
- 管理与创意相关的业务支撑数据，从市场信息到企业战略以及相关的财务统计比对分析
- 实时可见的产品组合管理及分析
- 创新项目预算及研发资源及能力模型优化
- 研发战略路线图
- 项目执行和可视化



谢 谢



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