

French higher education, research and innovation policy in the 2000s: sweeping changes

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Contents

- 2 sections in this presentation:
 - French innovation policy
 - French Public sector research
- Similar approach for each section:
 - the situation in 2000
 - main shifts observed
 - comments
- French situation in 2010: sweeping changes!
- A Note: No consideration about the overall governance (new wordings – *Haut conseil pour la S&T, Stratégie nationale de recherche et d'innovation, SNRI* - but no changes in long standing practices)

Part 1

A complete redesign of the Innovation Policy

- 1- French innovation policy in 2000: main features
- 2- Looking at numbers: the stable 2000s
- 3- Nurturing the 1999 innovation law
- 4- A shifting approach
- 5- The short lived Agency for Industry Innovation
- 6- A massive new tax credit
- 7- From top-down to bottom-up definition of strategies:
Pôles de compétitivité
- 8- A first appraisal of the new landscape

French innovation policy in 2000: a recap



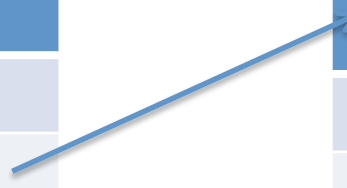
- 4 lasting features of the French innovation policy:
 - focusing on 'secteurs de pointe' & national champions (aerospace, nuclear, ICT and transport)
 - the central role of Defence in the support of firm R&D
 - post WWII 'centres techniques' to support traditional industry sectors
 - a long standing project-based support to SME & ETI complemented by a limited tax credit (based on the growth of R&D expenditures)
- The emergence of a recent focus on start-up firms, officialised by the 1999 innovation law

Looking at numbers: the stable 2000s

	1999	2008
R&D intensity (GERD/GDP)	2,16%	2,08%
GERD (execution)	29,5B€	40,6B€
Share of firms	63%	63%
GFRD (funding)	30B€	41,7B€
Share of firms	55%	55%

BERD: sources of funding	2001	2008
Firms	87%	86%
Public funding	13%	14%

Public funding sources	2001	2008
French defence	56%	57%
French civil	24%	29%
Int'l sources (ESA, CE...)	20%	14%





The start-up ecology: nurturing the 1999 innovation law

- A complex web of small instruments
 - Easing the possibility of researchers to participate to the creation of new firms (some 800 over one decade)
 - Supporting the emergence & development of incubators (30 incubators & over 2600 individual projects supported in 1 decade)
 - A yearly competition for new firms: 1200 firms created in 1 decade
 - OSEO new 'seed participation loans: 150 companies in 2009
 - nurturing 'venture capital': *fonds commun de placement pour l'industrie* (offering to individual investors income tax reduction)
- Specific status of Young Innovating firms (JEI, created 2004) offsetting social costs of R&D for company (over 2300 firms in 2009 & 120M€)

Note: see appendix for details

Innovation policy in the 2000s: 2 major changes



- Supporting large firms innovation capabilities: direct vs indirect approaches
 - Beffa's attempt to reinvigorate the champion-based 'large project' approach: [the failure of the new All agency](#)
 - The choice for a [new tax credit mechanism](#): a 3B€ transfer towards large firms in 2008
- Supporting SME & ETI (up to 5000 staff):
 - Reinforcing the bottom-up project-based approach (ANVAR merged in OSEO, Eureka, ...)
 - enlarging the role of the tax credit (1.2B€ in 2008)
- Supporting industries: Moving from top-down selection of areas to bottom-up, collective competition-based approach: [pôles de compétitivité](#)

The short-lived innovation agency

- Beffa and his vision of the renewal of any industry through breakthrough innovations → support strategic breakthrough industry-led collaborative projects
- New specific agency: All (industrial innovation agency, 1.5B€)
- Difficult relations facing EC competition rules (a project by project authorisation process)
- Merged into OSEO after 2 years of life and downsized / redefined for SME/ETI projects (under the name of strategic innovation projects: 21 projects supported from 78 SME/ETI & 53 labs, 150 M€)
- A comment: Beffa's view was it should be done at EU level. In a way JTI (like Clean Sky) correspond to this view...

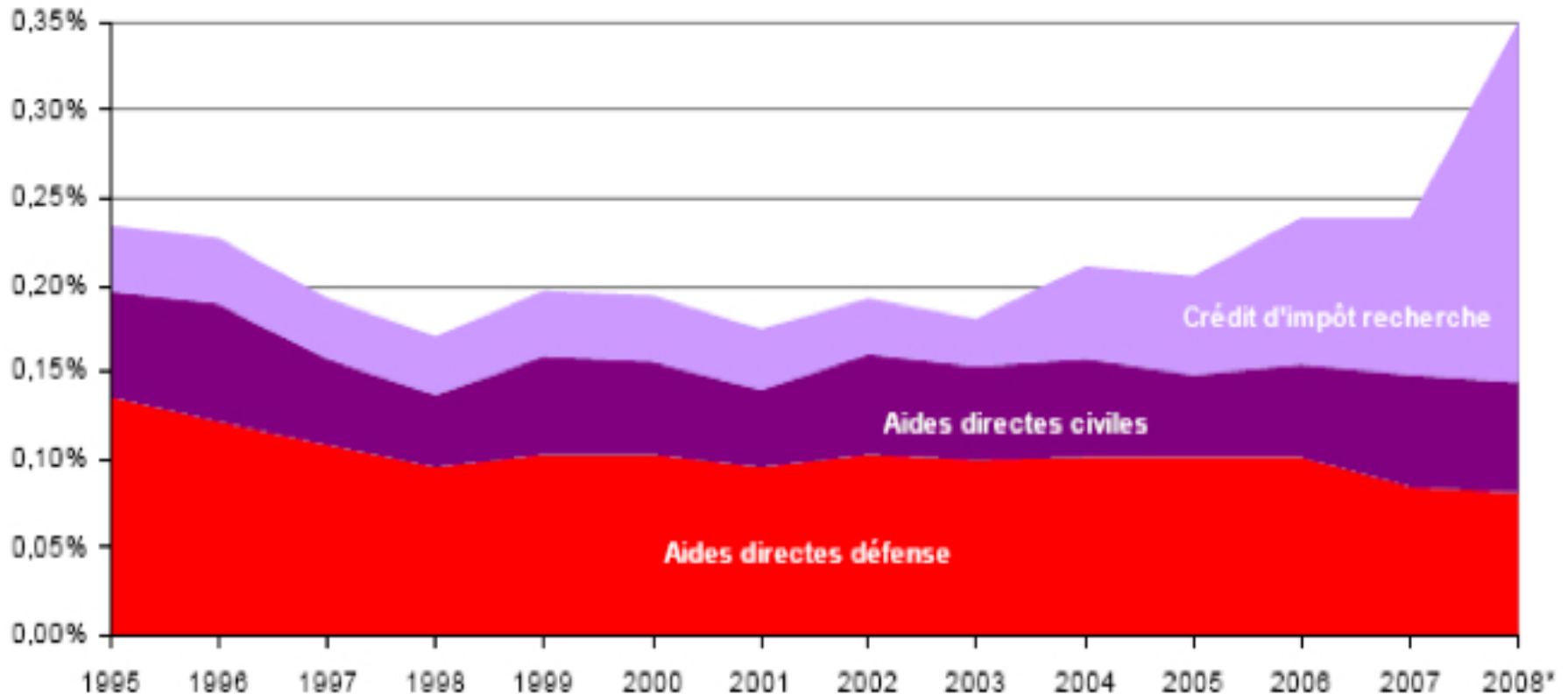
A massive new tax credit (1)

- A complete reversal of the French support to Firm R&D: from large programmes to a R&D tax credit based on volume and unlimited (see evolving definitions below)
- consequences: 400M€ until 2003, 900M€ in 2004-5, 1.5B€ in 2006-07, 4.2B€ in 2008, probably over 5B€ in 2010

CIR	Avant 2004	2004	2006	2007	Since 2008
% Linked to firm volume of R&D	-	5%	10%	10%	30% until 100M, 5% above
% Linked to increase of firm expenditure	50%	45%	40%	40%	-
Maximum amount (Million euro)	6,1	8	10	16	Unlimited

A massive new tax credit (2)

Large firms as main beneficiaries: independent SME (20%), independent ETI (9%) and large groups (over 5000 staff) (71%)

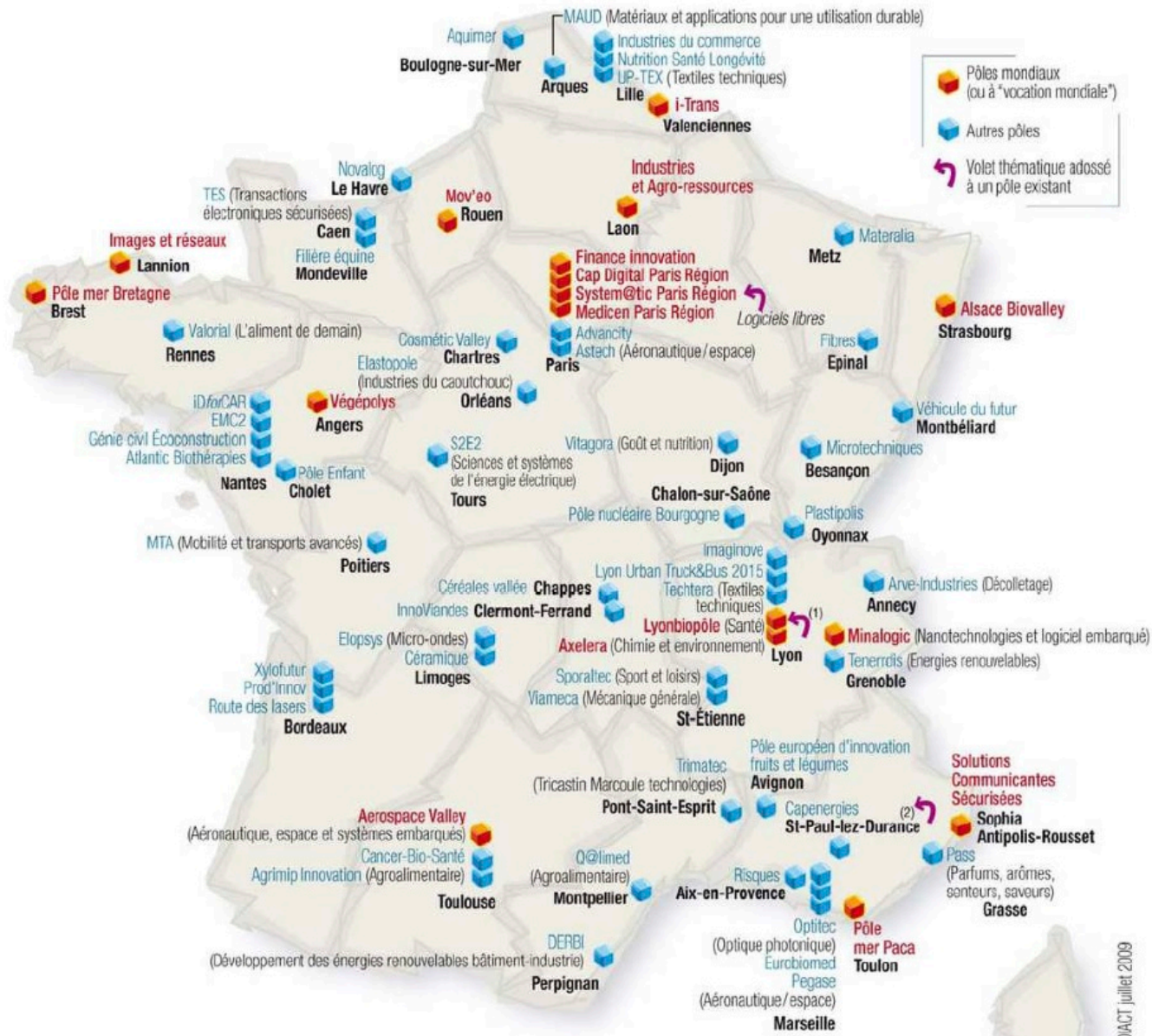


Pôles de compétitivité (1)

- **The emergence of 'poles' as a combination of:**
 - decentralisation & the take-up by regions of research and innovation as a means toward economic development
 - a longstanding practice within the French administration (DATAR) of quasi 'Italian industrial districts' approaches
 - the success of Porter's approach to clusters
 - the proximity of success cases in France (Grenoble) and in Spain (the Basque country)
- **Crystallisation by a new député, C. Blanc** with its dual background as the high civil servant having solved the Caledonian problem and as a high flying industrialist (having taken Air France in quasi-bankruptcy and having brought it to the most profitable world airline) → His report drives to a policy change within weeks!

Pôles de compétitivité (2)

- **The 2005 competition** is so successful that the Government doubles its engagement (from 1.5 to 3B€ over 5 years) for:
 - 6 world-level poles
 - 9 potential world-level poles ('the nursery')
 - 42 'national poles'
- **A second 3-year support (2009-11)**: The evaluation shows important achievements, though uneven, and drives to continuous support, with marginal evolution of the list of poles (71).
- **Public support over 5 years**:
 - through mobilisation of existing funds: ANR collaborative projects (950M€), AII/ISI funds (570M€) & OSEO funds (340M€)
 - through a new fund (FUI) now managed by OSEO (950M€)



- Pôles mondiaux (ou à "vocation mondiale")
- Autres pôles
- Volet thématique adossé à un pôle existant

(1)
Santé tropicale
(Lyonbiopôle)
Guyane

(2)
Technologies écoefficientes
(Capenergies)
Guadeloupe

Qualitropic
(Agronutrition en milieu tropical)
St-Denis de la Réunion

Source : DGCCIS/DACI, juillet 2009

French innovation policy in 2010: a renewed landscape



- Initial measures of the size of transfers operated
 - Defence contracts to industry remain stable over the decade (2B€*)
 - Civilian contracts to industry also (around 1B€*): decrease in high tech sectors being compensated by increased support to SME & collaborative research
 - Tax credit (CIR) moves from 0.4 to 4.2B€, witnessing de facto a 4B€ increase in support to French-located industrial R&D
- A complete change of approach
 - Classical top-down models remain (mostly in ICT via Eureka and JTI) but downsized, being financially marginalised
 - Self definition by firms prevail whether indirect (CIR) or direct (OSEO)
 - Bottom-up defined collaborative spaces prevail (via poles)
 - Competitions become central for fund allocation (Poles FUI, ANR collaborative projects, ...)
- An open question: will 'Investissement d'avenir' change this trajectory? (see later & appendix)

* In current value

Part 2

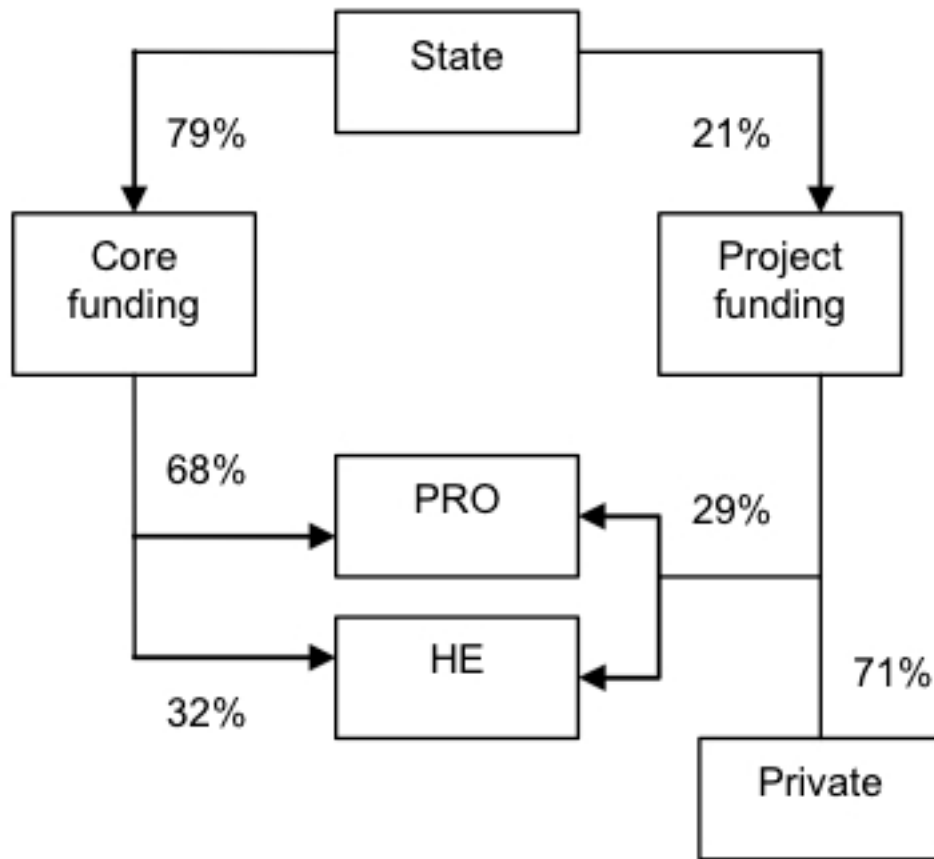
Making French public sector research 'euro-compatible' or the alignment to the dominant world model

- 1- Recapitulating the main features of French PSR in 2000
- 2- Changing legal environment of Universities
- 3- Evolving relations between the Government & Universities
- 4- Universities and the winds of excellence
- 5- The emergence of a powerful funding agency, ANR
- 6- About '*Investissements d'avenir*'

Public sector research in 2000: recap (1)



Limited project-based funding



A unique role of Europe within project-based public funding

Project funding sources	2002
Government	41%
French Agencies*	27%
FP & ESA	32%

* Mostly CNES for space, ADEME For energy, ANRS for AIDS & ANVAR for SME R&D projects

Public sector research in 2000: recap (2)



- French specificity in Europe: the critical role of PRO within public research (57-58% of total PSR execution)
- Still an important 'silent' change in the 1990s
 - the evaporation of Defence labs (from 20% to 8% and then 6% of PSR execution)
 - the growing role of Universities (from 25% in 1992 to 35% in 2000)

Public sector research: execution	1992	2000	2009
Universities	25%	35%	36%
PRO- CNRS	17%	17%	20%
PRO- 'EPIC'*	24%	28%	24%
PRO- Other finalised	13%	12%	14%
Defence	21%	8%	6%

Main EPIC = CEA, CNES (+ ONERA, IFREMER, CIRAD...)
Main other OPR = INRA, INSERM, INRIA, IRD

Changing the University legal environment



- 1999-2002: The Bologna approach adopted with its 3 layers: Bachelor (180 credits), Master (120 credits), doctorate (180 credits) (fully generalised before end of decade)
- 2000 onwards: creation of doctoral schools (& progressive delegation of Government PhD grants)
- 2006 research law and '*Pôles de recherche et d'enseignement supérieur*' (**PRES**) to favour local structuring and critical mass
- 2006 research law and the possibility to create **foundations** to help professionalise relations with industry
- 2007 law changing university governance, to foster 'effective' autonomy & the development of proactive strategies by universities

Evolving Government-University relations



- The lasting central tool of 4-year contracts between Universities & the Ministry, now harmonised at PRES level.
- 2007 onwards: progressive application to universities of the 2001 law on public finance (LOLF):
 - Managing directly their own staff
 - owning & managing their own buildings
 - consolidated budget
- An independent agency (AERES, created in 2006) in charge of the external evaluation of teaching curricula, research labs and university strategies (evaluation and grading are on the web).

Nurturing University-Industry linkages



- A growing mobilisation by firms of **CIFRE** – a trilateral contract between a PhD candidate, a firm (which is the employer) and a research lab, supported by the Government (1200 in 2009)
- A longstanding instrument revisited: **Technology Resource Centres**
 - A National label (quite difficult to get 62% success rate)
 - Mostly regional funding (55M out of 70M€ in 2009)
- The creation of a new type: ***Instituts Carnot***
 - A structure to foster public research – industry connections at the ‘local’ level (mostly a group of labs on a given theme)
 - A national competition every 4 years (managed by ANR): 33 centres in 2006-07; 34 in 2011 (24 renewed, 10 new ones)
 - Support granted based on new industry contracts obtained, but independent of them to renew capabilities. 60M€ yearly.
- Both have developed a national coordination: AFCRT and AI Carnot.

Universities & the winds of excellence



- A major turn in political appraisal of universities: the Shanghai ranking AND the German excellency initiative.
- A good example: the EU French presidency & the creation of a European ranking!
- First move: 2005 & the creation of a new project-based funding agency (**ANR**) via transfer of all ministry incentive funds (200M€) & a planned increase to 1B€ within 5 years
- First round of selective support to Universities: **Plan Campus** (2008): 5+1B€ in endowments to 12 universities (PRES) for their infrastructure (using public-private partnership as the main implementation mechanism)
- Second round of selective support (2010-11): **'Investissements d'avenir'** (19B€ mostly in endowments)



A new powerful funding agency: ANR (1)

- **Autonomous Agency:** Initiated 2004, started operation in 2005, stabilised in 2006
- **Governance**
 - Governing board,
 - 8 Strategy & Planning boards,
 - a Foresight council,
 - a yearly consultation of the academic & industry communities
 - all processes are ISO 9001 certified
- **Allocation of funds:** 650M (2009) through calls complemented for PSR by 'preciput' allocated directly to organisations (11% on average, 64M€ in 2009) + 61M to *Instituts Carnot*.
- **Competitive calls in 2009:** 58 calls, 1334 projects selected (selection ratio: 23%), over 14000 reviewers (38% foreign, 7% from industry), on average 2,9 partners per project, 650M€ (0,49 per project, 0,17 per partner)

A new powerful funding agency: ANR (2)



- Some key features
 - 65% thematic programmes, 35% non thematic (moved to 50% in 2010)
 - 68% fundamental research, 28% industrial research
 - beneficiaries: CNRS 32%, Other PRO 25%, Universities & other HE 24%, companies 12%, other 7% (2009 data)
- A fast growing International dimension:
 - 3 modes: ERA Nets (& article 169/185) 30%, Bilateral initiatives 28% vs. opening of national programmes (44%, mostly non thematic programmes). Difference depends on joint call and selection or not.
 - 12% of projects selected, 8% of funds allocated (cover only the French partners) (2009 data)
 - 75% within Europe, 25% outside.

About 'investissements d'avenir' (1)



- A first experience in 2006 (RTRA) drives to being attentive to implementation structures
- An overseeing Prime Minister level body: *Commissariat aux grands investissements* (CGI)
- Altogether 35B€ over a 10-year period
 - 15B as endowment, 10B as grants, 10B as loans.
 - 33B covering intangible investments
- Implementation agencies
 - ANR (Higher education & research, 19B), OSEO, CDC, ADEME, ONERA, CEA & CNES (Innovation policy, 11B)
 - entering 10-year contracts with CGI (all publicly available)
 - 'scientific' selection through competitive processes (mostly with international panels)

About investissements d'avenir (2)



- 3 main domains: higher education & research (19B€), Innovation policy (11B€), wider environment of innovation (5B€)
- Higher Education & research: 5 dimensions
 - Universities of excellence (probably less than 10)
 - Laboratories and Equipment of excellence (probably around 200 altogether)
 - Technology focused institutes: Industry (6 selected), Energy (probably 8), built 50-50 with industry
 - Reinforcing technology transfer structures (including *Instituts Carnot*)
 - Specific focus on Life sciences
- Innovation policy: continuity prevails
 - Maintaining longstanding sectorial priorities: Space, Aeronautics, Transport, Nuclear energy
 - The shift towards contents in ICT policy and to 'decarbonized' energies
 - Reinforcing SME orientation via OSEO and poles

French Public Sector Research today



- A continuous growth in public investment over the decade
- A large share of the increase based upon competitive project-based allocations (ANR, RTRA, plan Campus and now *Investissements d'avenir*)
- French PSR is made 'eurocompatible' with
 - a powerful funding agency (fast engaging into new European approaches, i.e. ERA-Nets and Article 185)
 - a set of reforms of higher education institutions (Bologna, evaluation & accreditation, governance, new frames to foster the development of the 'third mission')
- Still the end result is a reinforcement of CNRS as the main performer! (see initial data, ERC as an interesting marker!)

Revisiting the French model in 2011



- Three major shifts in the design of R&I policies
 - From 'top-down' large programmes to bottom-up defined supports: direct (*Pôles de compétitivité*) & indirect (tax credit)
 - From national champions to SME/ETI (via OSEO & its variety of supports) & supporting an ecology of 'young firms'
 - From direct state allocation to competition-based allocations of new financial means allocated to RDI
- Aligning PSR to 'euro' standards with:
 - a powerful funding agency
 - and a strong change process of universities: redefinition of their borders (PRES & mergers), rapid implementation of Bologna approaches to HE, organisation of independent evaluation & accreditation (HE and research), strategic 'empowerment' (new governance, consolidated budget, control over recruitment & careers)
 - and a rich portfolio of new instruments to favour industry- university relations (Incubators,... and the original *Instituts Carnot*)

A final note on the role of the EU



- The legacy of **Hubert Curien** as a key ‘institutional entrepreneur’ of both ESA and the FP: delegating the generic knowledge bases but not public intervention in strategic sectors/areas.
- **A major ‘framing’ change** & its (in)direct influence
 - Lisbon and the annual discussions at Council level of ‘national reforms’
 - Organising & instrumenting comparisons (OMC, ERA Watch...)
- The shaping of **Europe of HE & research** as a major move & result
 - nurturing knowledge bases: ERC & ERA-Nets
 - organising key facilities joint planning: ESFRI
 - harmonising HE: Bologna process
- **Europe of innovation: dream or nightmare?**
 - framing a friendly innovation ecology: speeches that wait for action (IP, procurement...)
 - strategic sectors: old wine in new bottles?
classical post WWII ‘missions’ (energy, health, environment) with ‘joint programming’ as a way out of the federal / intergovernmental dilemma

Appendix:

Complementary information on

- French innovation policy instruments
- French support to university-industry collaborations

- *Investissements d'avenir*

(sources: R&D, innovation et collaborations, rapport 2009, MESR, Presentations by CGI for *Investissements d'avenir*.)



French innovation policy instruments (1)

- **OSEO instruments: an overview**
 - **Aide à l'innovation** (a project-based risk-sharing, no interest loan, created in 1968, managed by ANVAR since 1978 until merged into OSEO, limited to SME since the beginning of the 1990s). Total amount in 2009 (including loans associated to other activities below): 355m€ for over 2900 individual projects.
 - includes **loans to French firms labelled by EUREKA** (13 projects, 4m€ in 2009), and those in the 4 ERA-Nets (15 projects altogether in 2009), complemented by the **Eurostars programme** (28 projects, 5,5m in 2009)
 - **Support to contract research companies** (since the 1990s). 10m€ in 2009
 - Competition for the creation of new firms: 20m€ (see further slide)
 - **'seed participation loans'** (up to 150k€ per project): 20m€ in 2009 (and over 150 companies supported)
 - **Industry Strategic Innovation projects** (ex All): Launched 2005, Managed by OSEO since 2009. 21 projects supported in 2009 for 150M€ (78 SME/ETI, 53 labs) [NB: 1.2B€ spent by All mostly with large firms]

French innovation policy instruments (2)



- **Eureka clusters & JTI** (French ministry of economic affairs):
30 projects supported in 2009 for 5 clusters for 94 M€ (64 for Medea2/
Catrene; 11 for ITEA2; 9 for EURIPIDES; 6 for CELTIC; 3.5 for EUROGIA)
15 projects supported in 2009 for ENIAC & ARTEMIS (13M€)
- **JEI (young innovating firms)** (created in 2004)
 - def: SME, less than 8 years, independent, R&D intensive
 - support: social costs incurred on RD personnel by company deducted
 - from 1200 to 2300 firms in 6 years; from 6000 to 12000 staff concerned
 - from 62M€ in 2004 to 121M€ in 2009
- **Fonds Communs de placement pour l'industrie** (funds that offer tax credits for individuals investing into them; need to spend 60% on 'labelled' innovative SME): OSEO delivers some 300 labels per year
- **Competition for the creation of new firms** (created in 1999)
 - yearly competition for projects / 2 stages emerging – development
 - 1840 projects supported (990 emerging, 1230 development with 380 the 2 stages) / de facto 1180 companies created / 952 still in life end of 2009
 - 290 M€ of support in 11 years (20M€ in 2009, managed by OSEO)

French university-industry policy instruments (1)



- **Carnot Institutes** (managed by ANR)
 - Def: thematic or geographical grouping of research labs which engage into deepening relations with industry
 - 33 labelled in 2006/07 (24 relabelled in 2011 plus 10 new ones) representing 20000 researchers, 1.3MM budget & 215 M€ contracts with industry (+30% in 3 years, share of SME: 11%)
 - gathered in a national association of Carnot Institutes
 - public support = % of new contracts raised for 'renewing the knowledge base' (outside from contracts). 60M€/year since 2007.
- **CIFRE** (created in 1981)
 - Triangular contract between firm, lab & PhD candidate / PhD candidate employed by firm / support for firm (17k€/year)
 - In 2009, 1200 CIFRE (600 in 2001, 1/3rd women). 750 firms (50% contracts by large firms & 40% by SME) & 800 labs.
 - 50% in engineering & ITC; 20% materials & chemistry; 17% life sciences & 18% SS&H.
 - Cost: 50M€/year since 2005.

French university-industry policy instruments (2)



- **Incubator Policy (1999 innovation law)**
 - Label given to 30 incubators (mostly regional)
 - Support granted based on projects incubated: in 10 years 2600 projects for 66m€ of national support
 - overall 70% effective creation (out of which 30% with external funds: 10% business angels, 7% seed capital, 7% venture capital, 6% banks)
 - 600 projects under incubation in 2009: 32% by entrepreneurs coming from public sector research / only 11% women / 70% industry & 30% services / age distribution (35% for 36-45, 30% for 26-35; 20% for 46-55 and the rest equally shared on both ends)
- **Civil servants involved into start-up creation**
 - 1999 innovation law enables involvement of civil servants in creation
 - need authorisation (over 800 were granted it in 10 years)
 - 3 possibilities: long term consultancy (74%), initial involvement (21%), taking shares (5%)

French university-industry policy instruments (3)



- Regional centres for Technology Transfer (CRITT)
 - 3 types:
 - * technology resource centres (CRT): offer technical services
 - * Technology diffusion centres (CDT): information & diagnostic services
 - * Technology platforms (PFT): network of professional teaching *lycées* and institutes (IUT)
 - since 2007 need to be obtain official label to get public support: 83 CRT (+30 agronomic & agro-industry technical institutes), 43 CDT & 30 platforms in 2009
 - average CRT: turnover 1.55M€ (with 0.58M public support), 12 staff
 - average CDT: turnover 0,67M€ (with 0.54M public support), 5 staff
 - estimated public support in 2009: 70M€ (14M by central government, 55M by regional governments)

Investissements d'avenir: complements (1)



- Higher Education & research/managed by ANR, 18.9B€
 - *Initiatives d'excellence* (up to 10 PRES, intangible investments): 7.7B€
 - Labs of excellence (100 selected) and equipment of excellence (54 selected in first wave): 4B€ (2 theoretically included into *Initiatives d'excellence*)
 - University Hospital Institutes (5 selected), Bio cohorts, Biotech demonstrators & other life sciences: 2.4B€
 - Technology Research Institutes (6 selected) & No-Carbon energy institutes (under selection, up to 10): 3B€ of public support, doubled by industry engagements
 - Technology transfer mechanisms: Institutes Carnot, TT & seed capital companies (SATT): 1,5B€
 - complements to Plan Campus: 2.3B€

(Note: for calls, results and selection committees, go to ANR website)

Investissements d'avenir: complements (2)



- **Innovation Policy: 11.3B€**

- Support to OSEO loan capacity: 1.2B€
- Support to new ecotechnology developments (OSEO): 1B€
- Support to '*pôles de compétitivité*' & seed capital funds (OSEO, CDC): 0.9B€
- Support to 4th nuclear reactor generation (CEA/ANDRA): 1B€
- Support to Aeronautics demonstrators (ONERA): 1.5B€
- Support to Transport & Energy demonstrators (ADEME): 2.9B€
- Support to Space R&D (CNES): 0.5B€
- Support to new Information Society contents & uses (CDC): 2.3B€

- **Wider environment: 4.6B€**

- Investment in very high definition networks (CDC): 2B€
- Investment in sustainable cities & buildings (CDC, ANAH): 1.5B€
- Investment in continuous training (CDC): 0.6B€
- investment in secondary education & social equality (ANRU): 0.5B€

Notes: CDC (Caisse des dépôts et consignation), ANAH (Agence nationale d'amélioration de l'habitat), ANRU (agence nationale de la rénovation urbaine), ANDRA (Agence nationale pour les déchets nucléaires), ADEME (agence de l'environnement et de la maîtrise de l'énergie), CNES (centre national d'études spatiales), CEA (Commissariat à l'énergie atomique et aux énergies alternatives)