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Communication + Collaboration

“Technology management as a driver of knowledge management and Organisational Competitive Advantage”

Ian Atkinson (JCU) & Andrew Alexander (Commander) QUESTNet 2006



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Management Challenges for 21st Century

- **The most important contribution of management in the 20th century was the fifty-fold increase in the productivity of the MANUAL WORKER in manufacturing**
- **The most important contribution needed for the 21st century is a similar increase in productivity for the KNOWLEDGE WORKER**

Peter Drucker: Management Challenges for the 21st century



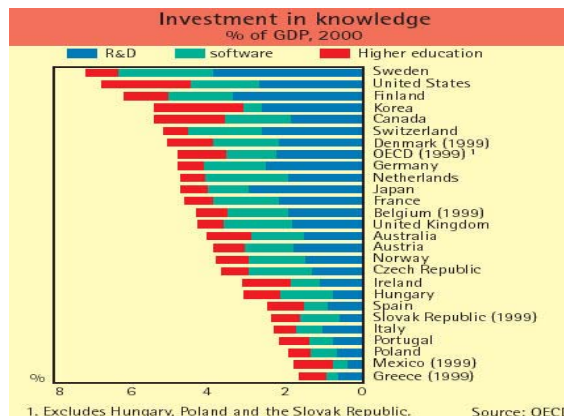
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Australia is Losing Competitiveness by comparison with other OECD countries

Country	Growth Competitiveness ranking 2002	Growth Competitiveness ranking 2002 among GCR 2001 countries ¹	Growth Competitiveness ranking 2001
United States	1	1	2
Ireland	2	2	1
Denmark	3	3	3
Singapore	4	4	4
Sweden	5	5	5
Switzerland	6	6	15
Australia	7	7	5
Canada	8	8	3
Norway	9	9	6
Denmark	10	10	14
United Kingdom	11	11	12
Iceland	12	12	16
Japan	13	13	21
Germany	14	14	17
Netherlands	15	15	8
New Zealand	16	16	10
Hong Kong SAR	17	17	13
Austria	18	18	18
Israel	19	19	24
Chile	20	20	27
Korea	21	21	23
Spain	22	22	24
Portugal	23	23	25
Ireland	24	24	11

Forum, W. E. (2003). Micro-economic Competitiveness Index. New York, Oxford University Press.

This is despite a high investment in R&D & Education (knowledge development)





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Australia ranked number one for investment in Higher Education (% of GDP OECD 2004)

Countries	Worker Productivity in Manuf	Capital Invest	Public Infrastructure Invest	Human Capital Invest	Total Factor Productivity	Trade	Net Efficiency
Reference (Core) Group,	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Australia	0.71	0.85	0.99	1.16	0.73	0.87	0.85
Canada	1.00	0.91	1.08	1.13	0.91	1.01	0.90
UK	0.92	0.88	0.92	1.13	1.00	1.08	0.93
USA	1.24	0.84	1.03	1.12	1.27	1.05	1.20
Norway	0.97	1.02	1.15	1.10	0.75	0.95	0.79
Japan	1.24	1.00	0.93	1.08	1.23	0.86	1.43
Sweden	1.11	1.05	1.08	1.04	0.94	1.02	0.92
Denmark	0.88	0.84	0.90	1.03	1.13	1.00	1.13
Korea	0.79	1.06	0.90	1.02	0.82	0.98	0.83
Finland	1.10	1.10	1.04	0.97	0.99	0.97	1.02



Source: Overcoming Barriers to Competitiveness
DEV/DOC(2004)08 © OECD 2004



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Countries	Worker Productivity in Manuf	Capital Invest	Public Infrastructure Invest	Human Capital Invest	Total Factor Productivity	Trade	Net Efficiency
Reference (Core) Group,	1.00	1.00	1.00	1.00	1.00	1.00	1.00
USA	1.24	0.84	1.03	1.12	1.27	1.05	1.20
Japan	1.24	1.00	0.93	1.08	1.23	0.86	1.43
Belgium	1.16	1.13	1.01	0.90	1.14	1.07	1.06
Denmark	0.88	0.84	0.90	1.03	1.13	1.00	1.13
Brazil	0.54	0.91	0.87	0.62	1.09	0.88	1.23
France	1.10	1.17	1.00	0.91	1.04	1.07	0.96
Spain	0.71	0.93	0.97	0.78	1.01	1.05	0.96
Netherlands	0.95	1.06	0.94	0.96	1.00	1.06	0.94
UK	0.92	0.88	0.92	1.13	1.00	1.08	0.93
Mexico	0.47	0.80	0.88	0.67	1.00	0.98	1.02
Finland	1.10	1.10	1.04	0.97	0.99	0.97	1.02
Austria	0.96	1.03	0.97	0.97	0.99	0.96	1.03
Singapore	0.80	1.14	0.98	0.74	0.98	0.98	1.00
Italy	0.83	1.09	0.94	0.84	0.97	1.00	0.97
Chile	0.60	0.88	0.85	0.82	0.97	0.76	1.29
Sweden	1.11	1.05	1.08	1.04	0.94	1.02	0.92
Canada	1.00	0.91	1.08	1.13	0.91	1.01	0.90
Turkey	0.40	0.94	0.84	0.56	0.90	0.88	1.03
Colombia	0.32	0.72	0.81	0.61	0.88	0.82	1.08
Korea	0.79	1.06	0.90	1.02	0.82	0.98	0.83
Peru	0.38	0.90	0.77	0.68	0.79	0.78	1.00
Norway	0.97	1.02	1.15	1.10	0.75	0.95	0.79
Australia	0.71	0.85	0.99	1.16	0.73	0.87	0.85
Cameroon	0.24	1.02	0.66	0.49	0.73	0.77	0.95
Senegal	0.20	1.11	0.63	0.40	0.71	0.84	0.85
Uruguay	0.30	0.70	0.88	0.71	0.69	0.77	0.89



Source: Overcoming Barriers to Competitiveness
DEV/DOC(2004)08 © OECD 2004

However this does not translate to national productivity

- Net Efficiency – equal 24th with Senegal (behind Uruguay)
- Total Productivity – 24th (behind Cameroon)
- Infrastructure Investment – 9th (ahead of Singapore)
- Capital Investment – 28th (behind Ecuador)
- Worker Productivity – 17th (behind Spain)



Components for Competency Development

Leonard-Barton (1992 and 1995)	Edvinsson (1997)	Anders Drejer (1997 and 2000)
Employee knowledge and Skills	Human Capital	Human Beings (informal assets)
Technical Systems	Structural Capital	Technology (Physical Assets)
Managerial Systems		Organisational (formal process)
Values and Norms		Cultural (informal process)

It is this interplay of all elements which enable organisations to develop competencies, success requires of all of them and not only just one or two.

Sustainable Advantage

“Strategic fit among many activities is fundamental not only to competitive advantage but also to the sustainability of this advantage. It is harder for a rival to match an array of interlocked activities....

Positions built on systems of activities are far more sustainable than those built on individual activities.” Porter ME. 1996. What is Strategy. Harvard Business Review: 61-78



Assumptions

(Tangible + Intangible Assets)

X

Capabilities

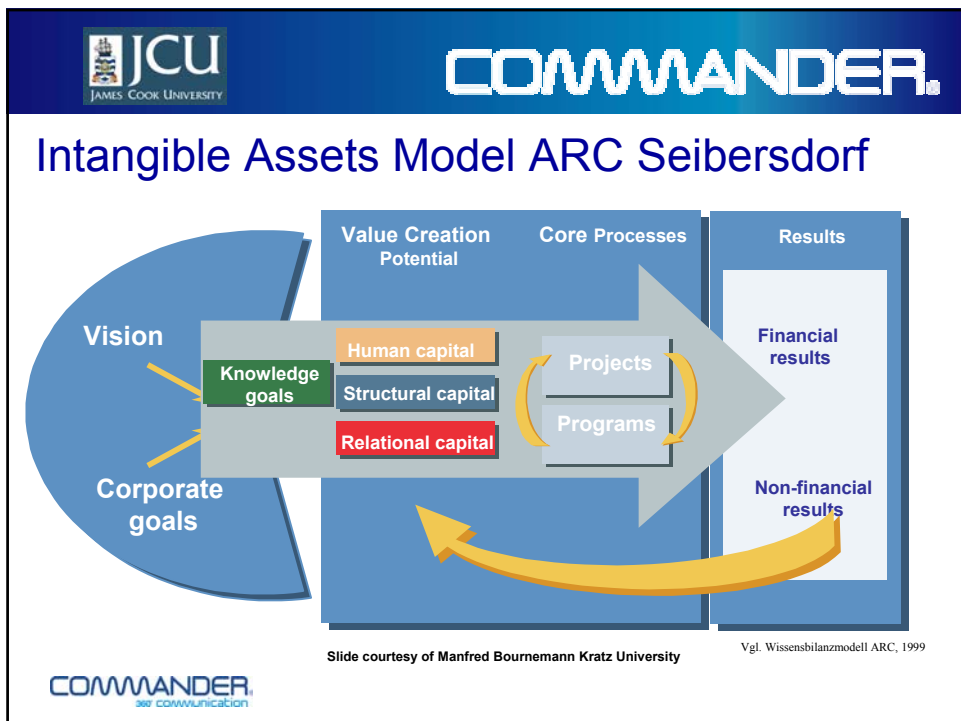
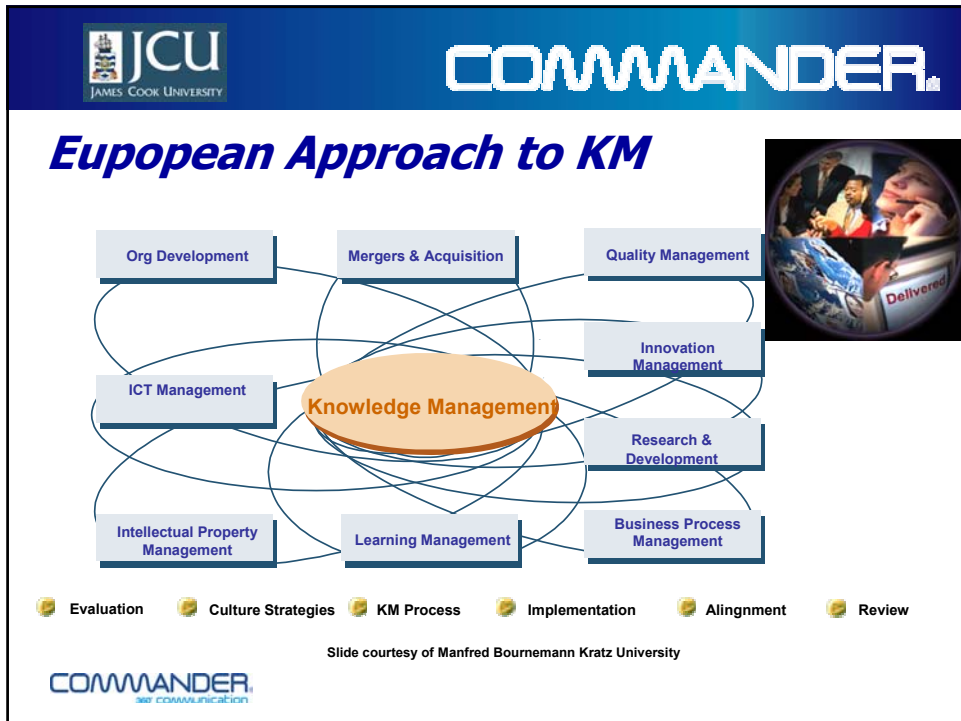
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Competencies



Competitive Advantage





European Lessons

- As much attention needs to be applied to Intangible Assets Management as Tangible Asset Management.
- Knowledge only creates value when used (Not Stored)
- Trust Issues determine the ability to transfer Knowledge
- Focus on specific issues not general ones (eating the elephant...)
- All Stakeholders should participate in any solution development
- Collaborations with Industry improves outcomes
- Communication is a key element of success
- Activity should focus on tangible benefits initially – process improvements, reductions in costs, development cycle reductions

Research & Development Issues

- Technology
 - Lack of Business Investment in Research
 - Lack of Transparency of IP created or available
 - Concern for Security of IP
 - No Common Infrastructure for Communication
- People
 - Lack of Trust between Researchers
 - Experience outside of Research
 - Poor Time management

R&D Commercialisation Rates

- Process
 - High Cost of and Time for Patent protection
 - Low rate of Commercialisation of IP
 - Linear Product development not simultaneous
- Culture
 - Trust Issues & protective attitude toward Knowledge
 - No Commercial Imperative
 - Researchers prefer freedom not control situations

“If we keep doing what were doing we keep getting what were getting”





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E-Research

“Where to now with E-Research”

Ian Atkinson
(JCU)



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e-Science, Cyberinfrastructure and e-Research ?

•*Lord Sir John Taylor:*

•‘e-Science is about global collaboration in key areas of science, and the next generation infrastructure that will enable it.’

•‘e-Science will change the dynamic of the way science is undertaken...’

•*Cyberinfrastructure* (NSF Office of Public Affairs, 2003)□

•Like the physical infrastructure of roads, bridges, power grids, telephone lines, and water systems that support modern society, cyberinfrastructure refers to the distributed computer, information and communication technologies combined with the personnel and integrating components that provide a long-term platform to empower the modern scientific research endeavor.

•Synonymous with other phrases, such as intelligent infrastructure, big science, e-Science, e-Research, and e-Infrastructure, cyberinfrastructure is the technological underpinning supporting today's major collaborative research projects.

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e-Science, Cyberinfrastructure and e-Research ?

- “The challenge of Cyberinfrastructure is to integrate relevant and often disparate resources to provide a useful, usable, and enabling framework for research and discovery characterized by broad access and end-to-end coordination”. (Fran Bergman, SDSC)
- The Grid is an infrastructure that enables flexible, secure, coordinated resource sharing among dynamic collections of individuals, institutions and resources. (Foster & Kesselman)
- E-Research
 - Enables remote, distributed collaboration and coordination to support big science
 - Large scale research that is increasingly being carried out through distributed global collaborations enabled by the Internet.

But is it all about BIG and SCIENCE???

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Dataset Acquisition, Acquisition & Accessibility

e-Research Technologies

- A ‘typical e-Research enabling project
- A DEST-SII funded project (<http://www.dart.edu.au>) to develop tools to handle the data & information management needs of diverse research environments.
- DART is developing tools to handle typical research data & information management needs, such as:
 - 1. collecting data
 - 2. managing data
 - 3. analyzing that data to produce useful information
 - 4. managing that information
 - 5. collaboration & annotation on the information
 - 6. publishing information
 - 7. searching on the information

• DMQ - Data Collection, Monitoring, Quality Assurance
• SI - Storage and Interoperability
• CR - Contents and Rights
• AA - Annotation and Assessment
• DA - Discovery and Access

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E-Research - Modes of Communication

'e-Research Formats'

- Data Repositories
- Multi-way video (AG)
- Collaborative documents and workspaces
- Workflow driven computing

'Traditional Formats'

- Publications
- Conference etc.
- E-mail/voice/fax

Models/software/workflows

compute...

compute...

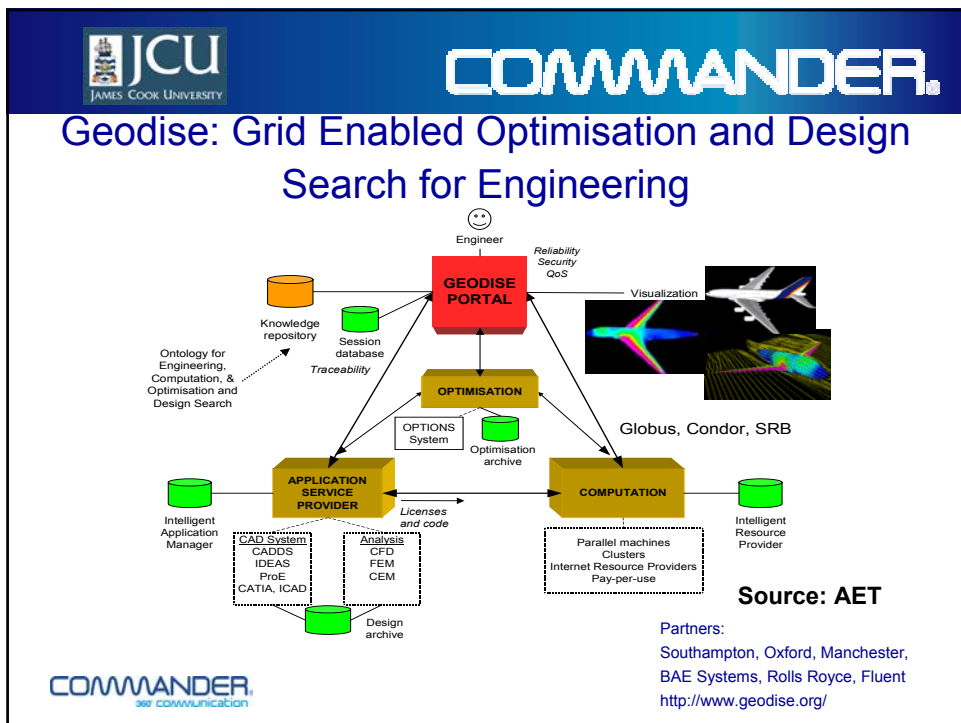
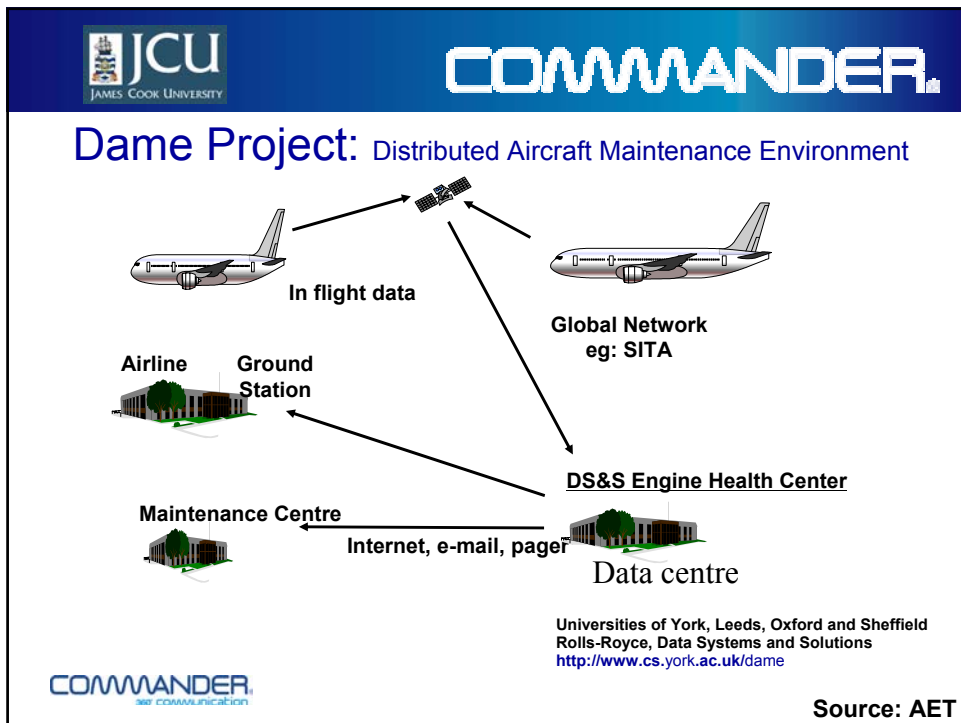
Sensor nets

instruments

colleagues

data

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Lessons and Conjectures

- E-Research is not just BIG and SCIENCE!
 - Small scale collaboration will be the real impact
 - e-Research is not just Research - there is a commercialization element.
- Tracking, tagging and auditing data & annotations may have a great impact in scientific outreach and commercialization

bang for the research buck...

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Technology Tools that can assist R&D

- Data
 - collection (CIMA), management (SRB, PGL)
 - analysis (portals, workflows, grids)
- Information
 - management (ontology's & schemas)
 - annotations (video, textual, freeform)
 - collaboration (portals, AccessGrids etc.)
- Publishing and searching information (arrow tools)
 - all being developed or assessed by DART and other SII projects (e.g. federated authentication by MAMS)

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Technologies Tools that can assist R&D

- Nortel Multimedia Communication server
 - Video or Voice Conference Bridge
 - Secure Voice/Data Network
 - VOIP, Video & Data Convergence
 - Presence Awareness
 - Instant Messaging
 - Chat Rooms
 - Inbuilt Whiteboard
 - File or Program Sharing

The simple fact is that you can't manage
what you don't measure.....



... but you cant measure what your don't
record.

Can E-Research use existing technologies to provide direction in the management of R&D activity through the development of a register for R&D activity?



How could a National Register assist?

Process

- High Cost of and Time for Patent protection
 - *Providing tagging of material that accurately identifies the owner/originator and date of the IP.*
- Low rate of Commercialisation of IP
 - *Provides transparent access to R&D activity and therefore ability to provide increased industry participation and collaboration from other researchers.*





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How could a National Register assist?

Culture

- Trust Issues & protective attitude toward Knowledge
 - *A Register would assist to identify the development date and originating inventor of specific IP.*
- No Commercial Imperative
 - *Builds Commercial awareness, facilitates contact with Industry. Register could act as 3rd party mediator.*

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How could a National Register assist?

Technology

- Lack of Business Investment in Research
 - *Enables business to engage with Research groups to solve specific problems*
- No Common Infrastructure for Communication
 - *Provides a common process and infrastructure for researchers to exchange views and information that protects their interests*

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How could a National Register assist?

People

- Lack of Trust between Researchers
 - *Provides record of interaction and sharing of IP*
- Experience outside of Research
 - *Enables controlled interaction with Investors and Industry*
- Poor Time management
 - *Provides common collaboration tools and reduced paperwork for reporting to Govt departments*



DISCUSSION ?

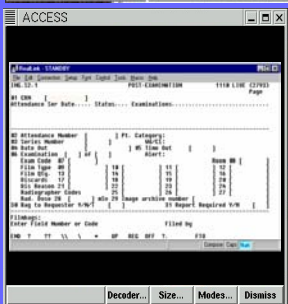
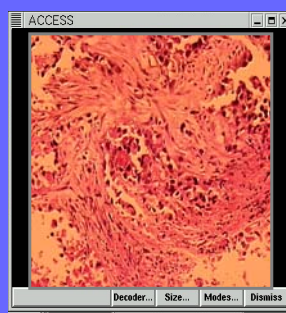
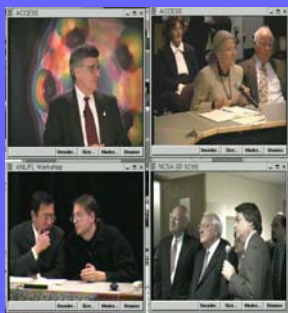
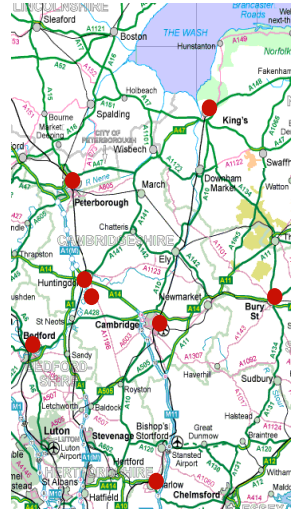


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West Anglia Cancer Network

- Cancer Centre
 - Addenbrooke's (Papworth)
- Cancer Units
 - Bedford
 - Peterborough
 - West Suffolk
 - Harlow
 - Hinchingsbrooke
 - King's Lynn

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Radiology, Cambridge,